EDITORIAL

MY remarks in the editorial of last month urging small ships to carry radio when venturing into the open sea have excited quite a bit of comment.

A couple of sailing types, friends of mine, were pretty caustic about the difficulties of fitting radio into every cockle shell that chugged through the Heads in search of some good fishing.

The expense, they said, was out of all proportion, and would impose an impossible inconvenience. How long would radio equipment last in an open boat, even supposing there was someone aboard who could work it?

But most people considered my point was well made. They thought it took quite a bit of cost and inconvenience to pay for the lives of those who could be and have been lost looking for thoughtless or unlucky mariners. They imagined that neither was really important to the airmen and the boat crews who willingly and instantly ventured out into danger to look for them.

There should be no room for doubt about the need of carrying radio in small ships.

Some Australian firms specialise in small, economical equipment, ideal for the work. Even suitable disposals units can still be obtained.

I agree that to fit a complete transmitter-receiver into an open boat or its near equivalent could present many difficulties, but an installation of this kind is not necessary to provide a radio signal by which the vessel can be located if in distress.

It is entirely possible to produce a small box with a collapsible aerial, containing a low-powered transmitter which would, when switched on, produce a coded signal on a selected band to act as a distress call and a homing beacon. Completely enclosed in a plastic cover, it could suffer even immersion without damage.

The idea was used extensively during the war, and is even more practicable now that we have transistors to allow operation for many hours on a small battery. Even low consumption valves could perform quite well.

Is there any reason why one such device should not be required as part of all small ship equipment? The cost should not be more than a few pounds, but it would ensure that no one in trouble would be lost or unable to make his predicament known.

It would also mean that he could be found and rescued with the minimum danger to those who come to look for him. Life and time are our most valuable possessions.

John Moyle

INDEX

	Page
Man Nears the Moon—Some Day	3
A Time-Table To The Moon	4
World	
B.B.C.'s Report On Colour TV	9
New Tape Cartridge Releases	11
Small TV Camera For Industry	15
More To Boiling Than Meets The Eye	16
Technical Review	21
News And Views of the Month	29
Transporta Six	32
Here's Your Answer Tom	45
Learn While You Build—Part 3	48
From The Serviceman Who Tells	57
1958 TV Set with 6in. Tube	63
A Reader Built It	77
Trade Reviews And Releases	79
How The Stereo Disc Works	81
Additions to Sweep Generator	87
New Books	91
Let's Buy An Argument	96
Off The Record—Reviews and Releases	102
Short Wave Notes	112
The Ham Bands	113
Answers To Correspondents	125

RADIO ★★ TELEVISION AND HOBBIES

A NATIONAL MAGAZINE OF RADIO, TELEVISION HOBBIES AND POPULAR SCIENCE

EDITOR
JOHN MOYLE
S.M.I.R.E. (Aust.)

TECHNICAL EDITOR
NEVILLE WILLIAMS
M.I.R.E. (Aust.)

TECHNICAL STAFF
MAURICE FINDLAY
A.S.T.C.

PHILIP WATSON
S.M.I.R.E. (Aust.)

W. YASHIN

MERVYN HUDDLESTON

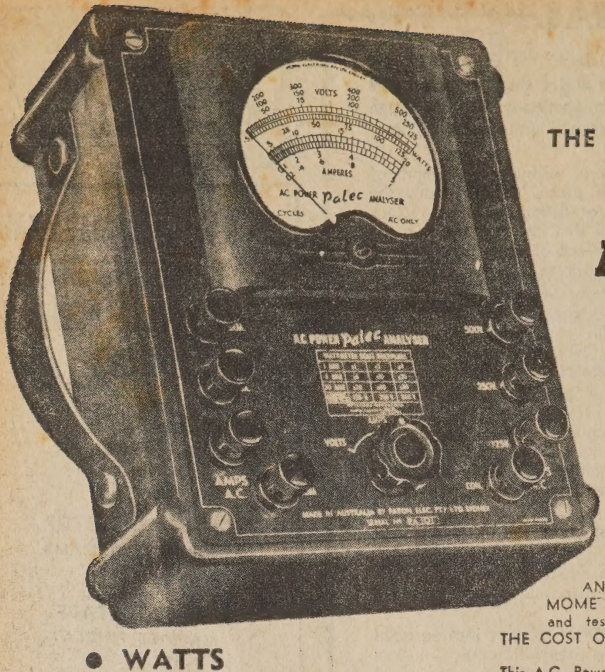
Vol. 20 No. 5

SUBSCRIPTION RATES
C'wealth, N.Z., N. Guinea, Fiji — £1/10/- p.a.
United Kingdom — £1/13/- p.a.
British Empire — £1/15/- p.a.
Foreign — £1/17/- p.a.

Phone ---------- BO944

OUR COVER PICTURE

A young listener falls for the charms of a modern transistor radio, made by Zenith, U.S.A., which weight about 1¾lbs and has a 3½ inch loud speaker.



THE PALEC DYNAMOMETER

A.C. POWER ANALYSER

An Invaluable Aid in:

REFRIGERATION: Sealed unit diagnosis

TELEVISION: Servicing

PLANT: Maintenance

PRODUCTION: Testing

LOW POWER FACTOR is electrica ENEMY No. 1. Find and correct this costl electrical waste with the Palec A.C. POWE ANALYSER, MODEL PA Australia's first DYNA MOME ER MULTIMETER for electrical service, maintenanc and testing. Electricity utilised efficiently could SAV THE COST OF AN INSTRUMENT many times over.

- **WATTS**
- **POWER FACTOR**
- **VOLTS**
- **AMPERES**

This A.C. Power Analyser, incorporates A TRUE DYNAMOMETE MOVEMENT of the nickel-iron cored type. There are no rectifier or non-linear resistance included, nor is it necessary to compensat for line voltage in wattmeter readings.

ACCURACY: Effects of wave form, power factor, voltage current and frequency variation are negligible.

EXTRAS: Leather carrying case. External Resistance Bo for 3-phase testing. Current and Potential Transformers fo extending ranges supplied at extra charge.

RANGES

VOLTS A.C.-D.C.	AMPERES A.C.	WATTS A.C.
0-125	0-2	0-10,000
0-250	0-5	9 ranges of watts
0-500	0-20	3 for each voltage range

TRADE PRICE £33/15/- plus tax. TERMS.

MULTIMETERS

Two models are available:

Model M32-1,000 Ohms per Volt

Model MX32-20,000 Ohms per Volt

These multimeters are indispensable for modern ELECTRICAL, RADIO and T.V. installation and service.

RANGES:—

Volts D.C. 0/0.1-3-10-30-100-300-1000	7
Volts A.C. 0/3-10-30-100-300-1000	6
Current D.C. 0/1-3-10-30-100-300 mA.-1-3-10 amp.	9
Current A.C. 0/1 mA. (for use with ext. current transformers)	1
Ohms 1-10 megohms	3
Decibels Ref. level 1 mW. in 600 ohms	3
Decibels Ref. level 6 mW. in 600 ohms	3
Total	32

T.V. NOTE: External probe available for Model MX32 to extend range to 30,000 volts D.C.

TRADE PRICES

Model M32, £17/18/6. Model MX32, £25/17/6. All prices plus Sales Tax.

● MODEL M.32

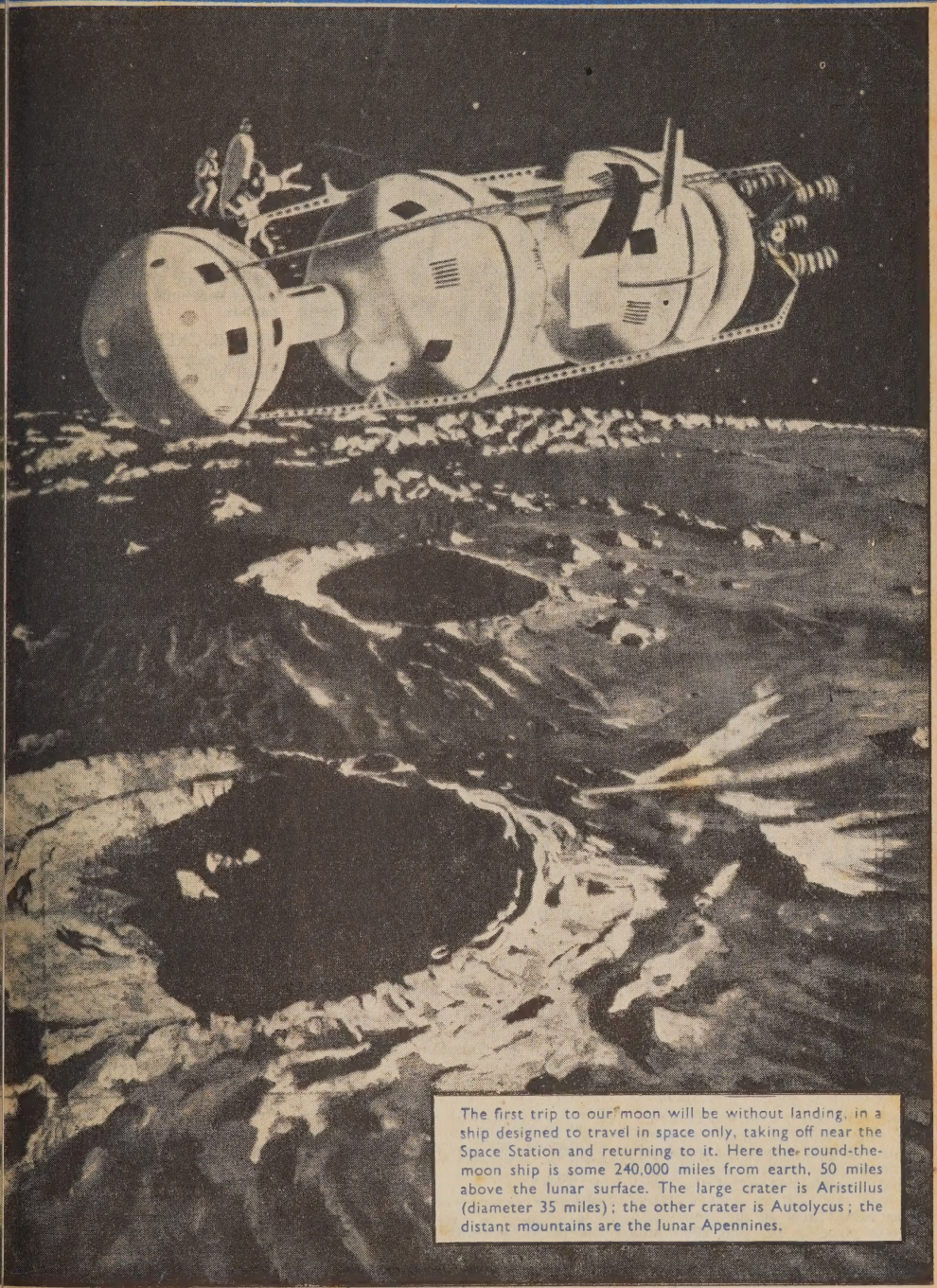
Paton Electrical Pty. Ltd.

ASHFIELD, SYDNEY ● UA0381

REPRESENTATIVES:

MELBOURNE: R. G. Holloway, 299 Little Lonsdale St. BRISBANE: K. H. Dore & Sons, 465 Adelaide St. ADELAIDE: Newton McLaren Ltd., 17-23 Leigh St. PERTH: Carlyle & Co. Ltd., 915-917 Hay St. TASMANIA: Gebbie Harvey Pty. Ltd., 76 Wellington St., Launceston. NEW ZEALAND: Carrel & Carrel Ltd., 41 Shortland St., Auckland

MAN NEARS THE MOON - SOME DAY



The first trip to our moon will be without landing, in a ship designed to travel in space only, taking off near the Space Station and returning to it. Here the round-the-moon ship is some 240,000 miles from earth, 50 miles above the lunar surface. The large crater is Aristillus (diameter 35 miles); the other crater is Autolycus; the distant mountains are the lunar Apennines.

HOW IT LOOKS—A photograph of the moon's surface taken by the 200-inch Hale telescope at the Palomar Observatory. Shown is a flat region covered with many craters. The large crater at the lower right is Copernicus, one of the moon's best known features. The sun is illuminating the moon from the left in this picture, and the left portions of the walls of the craters cast a shadow inside, while the right walls are illuminated within casting their shadows outside the crater.

A Time-Table To The Moon World

By general agreement, the moon will be the first extra-terrestrial body to be directly contacted by man. The most important question is—when? In this article the author gives his answer, and attempts to estimate the various steps leading to it. We have much to learn and do before our space ships can make a landing.

In tonight's sky is a target—a round, silvery object some 240,000 miles away. It is large—2,160 miles in diameter.

When examined with a telescope it is seen to be quite rough. We call it the moon.

For thousands of years man has dreamed of going to the moon. Today that dream is almost a reality. Many of the older people and all of the young who read this will be around when a human being lands on the moon. This will take place by the year 2000 A.D. —give or take a few years. It may be longer if wars intervene to halt the rapidly accelerating technological advances. It will be shorter if a technological breakthrough like a nuclear-powered rocket materialises.

Manned flight to the moon cannot be initiated as a project in the immediate future. A tremendous volume of preliminary work must be completed first. Before we can think of landing on the moon it will be necessary to establish a manned space station circling the earth as a base of operations.

There are steps, however, that can be taken in the immediate future—any ment now. The first is simply to ai "something" at the moon and sco bull's eye. This is not a difficult tas one has the tools to build, aim and g the "something."

The first man-made object to lan the moon will be a "marker" to scientists how close they have com getting on target. It may be a conta of fine glass beads, white powde even a fluorescent dye blown apar TNT.

There could be scientific benefit f this shoot—a more precise determina of the lunar mass. Accurate trackin the rocket would help determine moon's pull at points along its p From this information would evolve mass of the moon.

A 30-pound payload would be n sary for this. If we assume that every pound of payload delivered the moon about 2,000 pounds of and hardware are needed, we requi rocket with total weight of about 60 pounds.

BIG ROCKET

This three-stage rocket would s about 80 feet high, with the first slightly over 55 inches in diameter

While this is a theoretical rocket, Lockheed Missile Systems Division fabricated a practical system. Thei 17 is a three-stage rocket capable speed of 24,000 feet per second. If were scaled up, one more stage c add the extra 11,000 f.p.s. necessar hit the moon.

Guidance for this marker syste not difficult to achieve. An ICBM g ance system, to perform satisfacto must possess a tolerance of a few te of a degree. But in aiming a rocke the moon the error could be as l as half a degree. Thus in the guid component of an ICBM we would the guidance to put a payload on moon.

Directional guidance is not the problem, however. There is the que of proper speed at the cut-off p where powered flight ends and the ro is to coast onward—or, as space plan say, is to be "injected"—into a l trajectory. George H. Clement of Rand Corporation has investigated aspect and his conclusions indicate the cut-off speed must be rather cise.

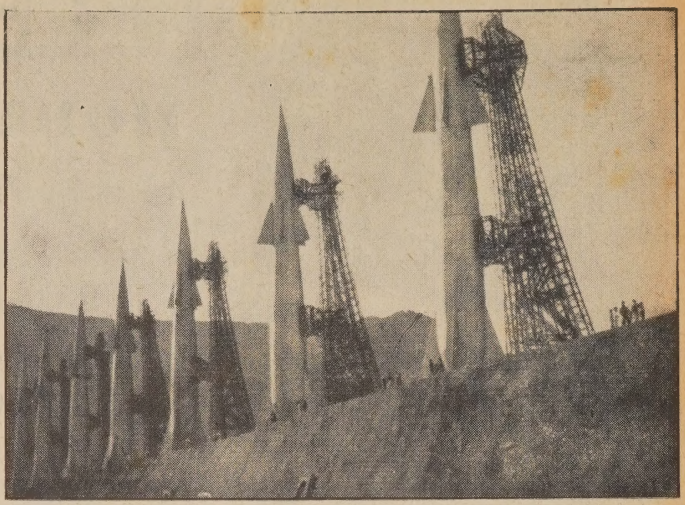
At 350-mile altitude, which he sumes for the cut-off, or "inject point as a basis for calculation, es velocity from the earth is 35,165 per second (about 24,000 miles an h That is, a rocket reaching this alt at more than this speed would es from the earth and circle the sun.

To project a payload from 350 altitude to a range of some 240 miles, the distance of the moon the earth, a cut-off speed of 34,850 would be needed—a trifle less than absolute escape speed. This vel goes down slightly, to 34,800 f.p.s the moon is there to serve as destina its gravitational field accounts for difference of 50 f.p.s.

Actually the permissible variatio

By Dr. I. M. LEVITT
Director of the Fels Planetarium of the Franklin Institute

A SOVIET SCIENCE FILM VIEW



Travelling to the moon, Russian style. This picture, taken from a Soviet science-fiction film, shows freight-carrying rockets ready to take off.

From the same film we see men in space suits stepping from their machine to the moon's surface.

ed depends upon the precision of the gle of injection into the lunar trajec- y. At best, the cut-off speed must be d within 50 f.p.s., or about 1/7 of e per cent, of the intended figure.

The time needed to reach the moon critically tied to this velocity. If the ket leaves the assumed injection alti- le with a speed of 34,800 feet per sec- d, assuming zero error in the injection gle, the travel time will be slightly re than four days. If the velocity es up to 35,000 f.p.s., time is cut to days. If the speed is 35,500 f.p.s., 1¼ days.

The problem of seeing a marker on moon is made difficult by our tur- lent atmosphere. Atmospheric shim- r and distortion preclude the certain ntification of most existing surface ails less than one mile in diameter. is does not mean, however, that a n-made mark would have to be that . Brightness—reflectivity—of the spot ated by our fluorescent powder or ss beads would be an important tor.

OON MARK

The minimum diameter of a spot we ld observe with our 10-inch refractor the Franklin Institute Observatory uld be about 700 feet. But if we ld use the 200-inch Hale telescope, marker 35 feet in diameter could be n. Thus the size of the spot to be n depends on the aperture of the escope used.

The exciting next step will come a rt time later when an atomic bomb is loded on the moon. This payload ighs between 60 and 100 pounds. ing the same hardware-to-payload io, this three-stage rocket must weigh r 100,000 pounds. The rocket may 100 feet high and the diameter of the t stage will have to be increased con- erably to house the additional fuel.

An atomic-bomb explosion on the on would be visible to the naked eye an observer on the earth. The intense rgy of the bomb explosion would porise several thousand tons of the ar surface to incandescence. Scient- s on the earth could record the spec- of the explosion to determine the ments in this layer of the lunar sur- e. Thus some of the constituents of lunar surface will become known.

Astronomers have considered the sur- e of the moon to be covered with a er of dust or powder five or six inches k. Our knowledge of its surface can y be derived from the study of re- ted sunlight. The lack of any ap- ciable atmosphere on the moon pre- des erosion by rain, wind and snow. erosive effects are present.

MPERATURE CHANGES

The monthly changes in the tempera- e of the moon in going through a iation of several hundred degrees, the pping away of the lunar rocks by the n of meteors, the rapid change in perature—from 160 degrees F. to nus 110 degrees F. in an hour — ing a lunar eclipse, contribute to the aring down of the rocks to create the t that covers the lunar surface.

t is this complex dust that the astro- ner would like to analyse. An atomic losion on the moon might permit as nomers to verify their speculations. An atomic bomb set off on the moon ld dig a crater of large diameter — er, because of the reduced gravit- on, than it would on earth. The deb- ris from the crater scattered over the surface of the moon will form a new spot perhaps a mile or more in diameter. This will be visible through a big telescope even though special markings have not been used.

The next step is the landing of an instrumented payload on the moon. In his paper for the Rand Corporation, Clement has also explored this possibility. He visualised the payload as consisting of 50 pounds of instruments and 50 pounds of power supplies for the instruments. This payload has to land safely on the lunar surface—to bring it down in a crash landing would surely destroy the instruments. For a 100-pound payload about 550 pounds of rocket must be used to brake the fall. Thus the total payload for a device of this type is 650 pounds.

To put this on the moon from the surface of the earth will require a 175-foot rocket of three stages, with the first stage about 14½ feet in diameter. The all-up weight of this rocket will be close to a million pounds.

Instruments placed on the moon 240,000 miles away will relay to the earth precise knowledge of the lunar surface. One instrument will measure lunar gravity. This can be done two ways. One is measuring the time it takes for a known mass to fall a known distance; the other uses the period of a swinging pendulum. With these relatively easy methods the gravitational field of the moon can be determined to one part in a thousand.

Scientists believe the moon must have a magnetic field. Whether this is true can also be determined instrumentally.

The use of a lightweight mass spectro-

'TELETEST'

MODEL FS4A

A complete TV service generator

- Specially designed for Australian TV Service Engineers
- Easy to operate by Turret and Push Button

PRICE: £200 (plus sales tax)

FREIGHT COSTS EXTRA INTERSTATE

The "TELETEST" MODEL FS4A combines these features in the one instrument:

★ All ten Australian Channels selected by precision turret (better than 0.06%) with raster, horizontal, vertical or cross hatch modulation.

★ All ten Channels on sound (800 C.P.S. plus/minus 30 Kc Mod) — Carrier distance adjustable from 5.2 to 5.8 Mc/s from picture Channels.

★ I.F. output from 16 to 45 Mc/s in 3 bands.

★ Sound Channel output from 5.2 to 5.8 Mc/s, 800 C.P.S.: FM modulation.

★ Attenuator on all outputs, 60 ohms or 300 ohms.

★ Video output (pos. or neg.) available separately.

★ Portable and rugged — for all service work.

★ Size: $8\frac{1}{2}$ x 10 x $15\frac{1}{2}$ins.—Weight: 26lb.

AVAILABLE FROM THE SOLE AUSTRALIAN AGENTS:

JACOBY MITCHELL
EQUIPMENT FOR INDUSTRY AND RESEARCH

JACOBY MITCHELL & CO. PTY. LTD.

469-475 KENT ST., SYDNEY

PHONE: MA8411

MELBOURNE OFFICE: 189 BRIDGE ROAD, RICHMOND (JA6644)

THESE INSTRUMENTS MAY BE VIEWED IN THE SHOWROOMS OF THE FOLLOWING INTERSTATE DISTRIBUTORS:

VICTORIA
Radio Parts Pty. Ltd.
562 Spencer St.,
Melbourne

WARBURTON FRANKI (Melb.) Ltd.
380-382 Bourke St.,
Melbourne

QUEENSLAND
CHANDLERS PTY. LTD.
Albert and Charlotte Sts.,
Brisbane

SOUTH AUSTRALIA
GERRARD & GOODMAN LTD.
192-196 Rundle St.,
Adelaide

NEWTON McLAREN LTD.
17-23 Leigh St.,
Adelaide

aph could result in knowledge of the mospheric density, if an atmosphere ists on the moon. It it does, astro- mers believe it is less than 1/10,000 dense as the earth's. Measurements the density could go far below this nit.

Simultaneously with the efforts to land instrument payload may come recon- issance programs. In these the moon ill be circled by rocket ships that will turn to the vicinity of the earth. Many ientists have proposed such reconnais- nce vehicles but one of the most sophi- cated designs comes from Krafft A. nricke, of the Convair Corporation S, March).

His moon-circling rocket would ex- ed 100 feet in height and weigh 240,- 00 pounds. He visualises it as a recon- issance vehicle with pictorial infor- ation as the principal objective.

Payload would weigh between 400 d 800 pounds and would include idance equipment, a television camera, d radio gear.

IRST OBJECTIVE

The first objective will be a photo- connaisance of the lunar surface in- uding the other side of the moon. If is materialises, the astronomers will able to compare the moon's two des—the one we always see and the e we never see.

There is an extension of this recon- issance vehicle that may give scient- s a precise idea of lunar surface haracteristics. The program involves e use of two moon-rockets taking off r the moon, one right after the other. he first rocket, programed to crash on e moon, is armed with an atomic mb. When the bomb goes off, a tre- endous amount of surface material will blasted high into the lunar sky — gher than on earth, for the gravitation- field of the moon is but a sixth of e earth's.

When the lunar dust is highest the cond lunar rocket will sweep in from e sky. This rocket is programed to im down close to the surface of the oon and scoop up material in the dust oud. (While the A-bomb will have ade the dust radioactive, a tiny amount fficient for analysis should be no prob- m on that score.) The second rocket ill then use auxiliary jets to move it ck into a trajectory that will return to earth.

HE RETURN

The returning rocket will move into e earth's atmosphere at high altitudes, d then the flight path will be de- ressed 10 degrees to the horizon. Since is moving at about 35,000 f.p.s., the oon rocket would risk incineration, d to prevent this some novel way of ecting the instrument capsule may be evised.

Perhaps the capsule will be coated ith an unusually heat-resistant plastic ch as Teflon (as has been suggested Dr R. W. Porter) so that the heat ould "boil off" the Teflon without burn- g up the capsule. Or perhaps deceler- ion jets will be used. After the capsule as decelerated to a nominal speed, para- utes could be used to land it. A small dio transmitter in the capsule can nit a signal to help locate the fallen psule. That is one way of recovering ysical data from the moon, though at is moment the problems are of stag- ring complexity.

The last step, putting a man on

The attitude-altitude trajectory of the Project M moon rocket suggested by the U.S. Missile Test Centre in Florida. At 1, the first stage has exhausted its fuel and is jettisoned. The rocket is now moving at 4,000 m.p.h. At 2, the second stage is moving at 15,500 miles per hour. The rocket has tilted far over in its climb. Now it coasts in space up to 200 miles altitude. Small compressed air jets then bring the rocket into a position where it is exactly parallel—its attitude—to the surface of the earth. In rapid succession 3 and 4 are fired. The rocket is now on its way to the moon at 28,900 m.p.h.

the moon, will take a long time. It requires the erection of a full-scale space station to circle the earth at an altitude of at least 1,075 miles. At this space station the necessary materials can be assembled for the man-carrying moon rocket.

One reason for the space station is that, orbiting the earth, it has a speed of almost 4.4 miles per second (15,840 m.p.h.). An additional speed of hardly more than one mile per second is needed to pass from the preponderance of the earth's gravitational field into that of the moon's. Including the additional tasks of braking for a moon landing, and taking off again, the total performance required of a rocket in a space-station-to-moon round trip is less than for a trip from the earth to the space-station!

The manned vehicle will not look like a conventional streamlined rocket. This one will take off and land on places with no atmosphere, which makes streamlining unnecessary.

Leaving the space station with a speed of about a mile a second, the rocket heads for the moon. It will reach a point, 23,600 miles from the moon,

(Continued on Page 121)

THE MOON AS A MILITARY BASE

Military planners are already calculating the wartime advantages that could result from control of the moon. They would be considerable.

They believe that established outposts on the moon, armed with missiles, could have these vital strategic values:

1. Missiles aimed toward the earth from the moon could be watched and guided all the way from a single tracking station. But the opposite would not hold true, because of the earth's rotation.

2. The nation maintaining a military base on the moon would have excellent protection against surprise attack. Reason: If the moon base were attacked first, missiles would have to be launched several days in advance, with resultant loss of surprise. If the attack were made on the earth first, the moon base would be unharmed and ready to provide retaliation.

3. Additional advantages of a permanent military base on the moon would include excellent earth surveillance; lessened gravity (an aid in launching missiles at the earth); virtual absence of atmosphere, reducing the blast effect of countermissiles; and the possibility of locating launching sites on the far, or shielded, side of the moon.

These considerations by the military planners are something to muse about the next time you see the moon riding the sky.

THE WARBURTON FRANKI PAGE *Check it each month*

W.F.—TEST EQUIPMENT SPECIALISTS

offer you the finest, most reliable equipment available . . .

KEW CIRCUIT TESTERS

MODEL TK 30A
Size: 4in x 2¼in x 1¼in.
Model TK-30 is a midget size individual lack type circuit tester with a colour plastic panel and cabinet.
D.C. Volts: 15/150/750V (1000 ohms/V).
A.C. Volts: 15/150/750V (1000 ohms/V)
D.C. Current: 150mA.
Resistance: 100 K ohm (by 1.5V internal battery).
£5/15/ Postage: Vic., 1/; Inter., 1/

MODEL TK-70.
Size: 5in x 3½in x 1¼in.
Model TK-70 is a pocket size rotary switch type circuit tester with an insulated panel and steel cabinet.
D.C. Volts: 10/50/250/500/1000V (2000 ohm/V).
A.C. Volts 10/50/250/500/1000V (2000 ohm/V).
D.C. Current: 500uA/25/500mA
Resistance: 10K ohm/1 Mg. ohm (by 3V internal battery).
Decibels: −20 to +22 db.
+20 to +36 db.
£12/15/ Postage: Vic., 1/10; Inter., 3/

MODEL TK 50.
Size: 4¾in x 3½in x 1¼in.
Model TK-50 is a pocket size individual lack type circuit tester with an insulated panel and steel cabinet.
D.C. Volts: 10/250/500/1000V (1000 ohms/V).
A.C. Volts: 10/250/500/1000V (1000 ohms/v).
D.C. Current: 1/250mA.
Resistance: 10/100 K ohm (by 1.5V internal battery).
£8/19/6. Postage: Vic., 1/10; Inter., 3/.

MODEL TK-90.
Size: 6in x 4in x 2¾in.
Model TK-90 is a handy size rotary switch type circuit tester with a black bakelite panel and cabinet, having a high sensitivity 45 uA meter 20,000 ohms per volts on D.C. and 8,000 ohms per volts on A.C.
D.C. Volts: 10/50/250/500/1000V (20,000 ohms/V)
A.C. Volts: 10/50/250/500/1000V (8000 ohms/V)
D.C. Current: 50 uA/2.5/25/250mA.
Resistance: 5/50/500 K ohm/5MG ohm (by 3V internal battery).
Decibels: −20 to +5 db.
(0 db = .0775V 600 ohm)
+5 to +22 db.
£15/15/ Postage: Vic., 1/10; Inter., 3/

CATHODE RAY OSCILLOSCOPES

UNIVERSITY TVR-C3 . . . . **£56 plus 12½% S.T. F/Fwd.**
Oscilloscope 3 inch. This Oscilloscope, for bench or portable use, is ideal for TV, radio and industrial use and embodies all the features of larger instruments. The vertical amplifier has a response of 15 c.p.s. to 1 Mega-cycle within plus or minus 1 db. The time base is a Miller phantastron circuit with a frequency range of 15 c.p.s. to 25 Kc in five steps with fine control. Complete with graticule and instruction manual. Size 4½in x 8½in x 11½in. Weight 14lb **W.F. EASY TERMS.**

ASTOR 3in TYPE T.V.1. . . . . **£65. plus 12½% S.T. F/Fwd.**
HORIZONTAL AMP: D.C. to 100 KC/S (−6 db)
Max. Sensitivity 70 MV/CM R.M.S
Input Impedance 1 meg. ohm.
TIME BASE: Five ranges continuously variable control provides sweep of from 2 c/s to 50 Kc/s.
SYNCHRONISATION: Manual amplitude control.
MISCELLANEOUS: All deflection plates and grid of C.R.T. are available for direct connection at rear of instrument. Weight 12lb **W.F. EASY TERMS**

UNIVERSITY TVR-C5 . . . . **£120, plus 12½% S.T. F/F**
Oscilloscope 5 inch. Suitable for radio, TV, AF amplifiers, peak-to-p voltage measurements, etc
Vertical Amplifier: Three stage with cathode follower, variable attenuati Frequency response from 5 c.p.s. to 3 Mc plus or minus 1 db and mi 6 db at 5 Mc. Sensitivity 150 M.V. RMS per inch. In "Wide Ba position response at 6 Mc is minus 3 db. Sensitivity 1.4 volts RMS per in
HORIZONTAL AMPLIFIER: Cathode follower 20 c.p.s. to 1 Mc within db. Sensitivity 1.3 volts.
TIME BASE: A hard valve Miller phasitron circuit provides superior s chronisation. Frequency 15 c.p.s. to 250 Kc in seven steps with fine cont Size 9in x 12in x 21in. Weight 34lb. **W.F. EASY TERMS.**

OSCILLOSCOPE KITS:
Assemble your own instrument with "COSSOR" prefabricated kits. C plete Kit to build the type 1071K Double-beam Model, £117/10/, 12½% S.T., plus 15/ S/charge.
Or as above to build the type 1045K Single-beam Model, £74/17/6, 12½% S.T., plus 15/ S/charge.
W.F. EASY TERMS.

ELECTRONIC VOLTOMETERS

UNIVERSITY TYPE TVR-TV . . . . **£49, plus 12½% S.T. F/Fwd.**
This smartly styled Electronic Voltohmeter is suitable for TV and radio servicing and employs a large 8in illuminated meter. It will measure negative D.C. voltage, positive D.C. voltage and A.C. voltage in steps of 1, 3, 10, 30, and 100, 300, and 1,000 self contained. Peak-to-peak A.C. voltages may be measured up to 2,800 volts. There are seven ranges of resistance up to 1,000 megohms and the D.C. voltages can be extended to 30,000 volts by use of the external probe. Model TV30 Crystal probe and valve probe enable RF voltages up to 1,000 to be checked and the wide frequency response makes it entirely suitable for TV servicing and other applications. **W.F. EASY TERMS.**
TV 30 Hi-voltage Probe to extend D.C. volts range to 30 KV. £8/5/ plus 12½% S.T.
TV5 — Crystal R.F. Probe. £5/5/, plus 12½% S.T.
TV7 — Valve R.F. Probe. £7/5/, plus 12½% S.T.

PATON TYPE TV-M . . . . **£49/17/6, plus 12½% S.T. F/Fwd.**
42 ranges in all Measures resistance to 100 megohms.
Decibel ranges: D.C. volts; A.C. volts. **W.F. EASY TERMS.**
Extras: Crystal Diode probe—extends H.F. measurements to 400 mega cycles, £4/17/6, plus 12½% S.T.
Hi-Voltage Probe—extends D.C. volts to 30 KV. £9/10/, plus 12½% S.T.
COSSOR TYPE 1044, £37/12/6, plus 12½% S.T., plus 15/ S/charge
28 ranges. Measures Resistance to 1,000 megohms. A.C./D.C. Volts to 1,500.
Above instrument in Kit form, £29, plus tax, plus 15/ S/charge
W.F. EASY TERMS

MULTIMETERS

PATON M32—1000 ohms per volt £17/18/6, plus 12½% S.T.
MX32—20,000 ohms per volt £25/17/6, plus 12½% S.T.
D.C. current to 10 amps. A.C./D.C. voltage to 1000. Resistance to 10 megohms. Decibel ranges, etc

PATON M42—1000 ohms per volt £32/12/6, plus 12½% S.T.
A.C./D.C. current to 10 amps. A.C./D.C. volts to 1000. Resistance to 5 megohms. Decibels, capacity etc.

PATON M52—1000 ohms per volt £43/15/, plus 12½% S.T.
A.C./D.C. current to 30 amps. A.C./D.C. volts to 1000. Resistance to megohms. Decibels, etc.

PATON MX47—20,000 ohms volt. £39/15/, plus 12½% S.T.
A.C./D.C. current to 10 amps. A D.C. volts to 3,000 Resistance 50 megohms. Decibels, etc.

UNIVERSITY MVA-2.—1000 ohms per volt, £17/10, plus 12½% S.T.
A.C./D.C. volts to 1,000 D.C. current to 10 amps. Resistance to 1 megohm.
ALL ABOVE ON W.F. EASY TERMS.

VALVE CHECKERS

PATON ET4A, £37/15/, plus 12½% S.T. F/Fwd. W.F. EASY TERMS.
Embodying a self cleaning, flexible, lever action element switch, in accordance with R.M.A. code which will completely cope with past, present and future radio and television tubes, including picture tubes
Picture Tube Extension Lead available extra at 27/6, plus tax

TAYLOR 45C, £61/5/, plus 12½% S.T., plus 15/ S'charge. F/Fwd
Mutual Conductance Tester.

Data available for over 4,000 Valves **W.F. EASY TERMS**

UNIVERSITY TST-2 (Valve and Circuit Tester, £58. plus 12½% S.T F/Fwd.
This fine instrument is the latest in valve testers and can be used as a portable or counter type valve tester. Operates from A.C. mains and tests TV tubes as well as radio tubes. All valve elements are controlled by individual lever switches thus minimising the tester becoming out of date and a full range of 20 different filament voltages can be selected. Incorporates the University W4 polystyrene meter and is supplied with instruction book and all necessary data.
W.F. EASY TERMS.
Picture Tube Extension Lead, £3, plus 12½% S.T.

WARBURTON FRANKI (MELB.) LTD.
359 LONSDALE ST., MELBOURNE — PHONE MU 8351
QUEEN ST. LONSDALE ST. ELIZABETH ST.

OPEN SAT. MORNINGS
TRADE ALSO SUPPLIED

PLEASE INCLUDE POSTAGE OR FREIGHT WITH ALL ORDERS

B.B.C.'s REPORT ON COLOUR TV

Britain is proceeding cautiously with her plans for colour TV, and has not yet moved out of the experimental field. One big problem concerns the standards to be adopted. This interim report reveals how far the B.B.C. has progressed in this field.

THE B.B.C. has issued a report on the series of colour television tests carried out by its staff, in co-operation with the radio industry, up to the spring of 1957. It describes the results as promising, though further experimental work will be needed to resolve outstanding problems concerning mainly the design of equipment. The B.B.C. has formed the opinion that the system used in adaptation of the American N.T.S.C. system) is capable of giving acceptable results.

Since these tests were completed, a further series has been carried out. The results of these are now being analysed.

The field trials on which the B.B.C. now reports extended over a total period of 17 months and involved the analysis of over a thousand questionnaires, filled in by members of the B.B.C. staff and others who watched the results on special sets.

So far as reception of the colour picture is concerned, the B.B.C.'s verdict is that the colour pictures produced by the N.T.S.C. system as adapted to 405 lines, with the picture sources and display tubes that are at present available, are satisfactory. The problem of registration with the three-tube colour camera requires attention and certain features of the display tube could with advantage be improved, but the technical performance of the system is adequate for a satisfactory colour television service in the frequency bands at present in use.

TEST PROGRAMMES

The tests radiated from Crystal Palace from November, 1956, to April, 1957, from 93 per cent, and the slides by carefully examined; 94 per cent of technical observers found the pictures completely acceptable.

The results of the tests have been communicated to the Television Advisory Committee which has the task of advising the Postmaster-General on the whole field of television. The results have also included live studio performances, film been sent to the C.C.I.R. (International and slides. Of the observers, 89 per cent regarded the reception of the live scenes as satisfactory. The 35mm film as regarded as satisfactory by 100 per cent of the observers, and the 16mm 3 per cent.

The quality of the colour transmissions, when received in black and white on ordinary television sets, was also

The quality of ordinary black and white television, when received on a colour television set, was found to be generally satisfactory.

Radio Consultative Committee) which has just met in Moscow to consider colour television.

The B.B.C. will carry out further experimental transmissions from time to time. It is pointed out that there are many other problems to be solved: for example, the production of a reasonably priced colour receiving set and agreement on the future standards to be applied to the development of television in the United Kingdom. The decision whether or not there is to be a public service of colour television, and if so the system to be used, rests with the Postmaster-General.

Note: The B.B.C. started experimental transmissions from Crystal Palace on 625 lines in Band V on May 5. These are in black and white, though they are part of the colour television experiments. There is at present no intention of starting colour transmissions in either Band IV or V.

VERTICAL TAKE-OFF COLEOPTER

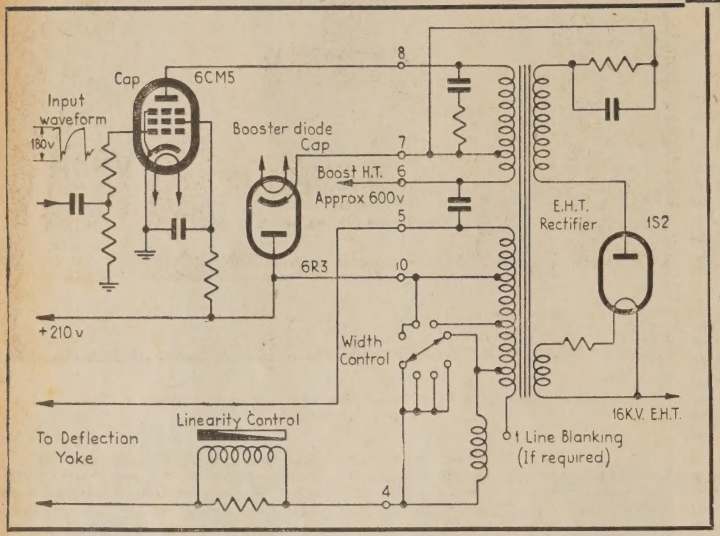
Vertical take-off aircraft to fascinate designers, ever since the famous "flying bedstead" developed some years ago. Here is the first picture of the top secret revolutionary French aircraft, the Coleopter. Powered by an "Ator" motor developed by Sneoma, performance details have not been released.

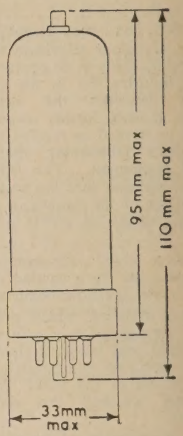
RACES ON COLOUR TV

A PROPOSED private use for colour TV in Britain is the provision of a closed circuit colour system at several of the larger race tracks, each race to be televised on to large screens for the benefit of patrons. Although still under discussion, it is considered that there are no serious technical problems to be overcome.

Mullard
TELEVISION VALVES

6CM5
LINE OUTPUT PENTODE





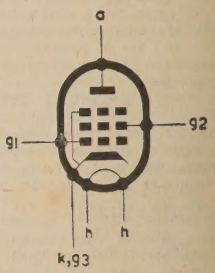
6CM5 CHARACTERISTICS

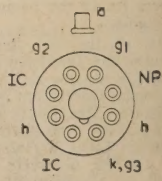
Heater ratings — *6.3V at 1.2A*

TYPICAL OPERATING CONDITIONS 90° DEFLECTION

Anode Voltage Supply (alternative Voltages)	200V	225V
Anode Voltage Boost	460V	472V (Approx.)
Total D.C. Supply	660V	690V (Approx.)
Screen Grid Voltage	200V	225V
Grid Input Voltage (pk to pk)	145V.	145V
Anode Current (D.C.)	110mA	85mA
Screen Current (D.C.)	30mA	28mA

The 6CM5 is a television line output pentode having anode and screen dissipation ratings of 10 watts and 6 watts respectively. Peak anode voltage ratings of 7.0 kV positive and 3.0 kV negative together with a peak anode current rating of 350 mA ensure its suitability for 90° deflection systems with EHT voltages of the order of 18 kV. The reserve margins available ensure long service life. Additional data is available to design engineers on request.





Octal Base

ISSUED BY THE TECHNICAL SERVICE DEPARTMENT

MULLARD-AUSTRALIA PTY. LTD., 35-43 CLARENCE ST., SYDNEY, BX2006, & 592 BOURKE ST., MELBOURNE, MU2
ASSOCIATED WITH MULLARD LTD., LONDON, MULLARD EQUIPMENT LTD., MULLARD OVERSEAS LT

NEW TAPE CARTRIDGE RELEASED

lay Revolutionise omestic Use

In our last month's issue, mention was made of a new tape cartridge announced in U.S.A. by the R.C.A. In this article, Bill Wilson of our New York office gives further details of the system for which a big future is predicted.

CA Victor in America have done for the domestic tape recorder what olumbia did for the record player 10 ars ago with the introduction of the ng-playing record.

The RCA company have announced tape cartridge for domestic tape re-rders that stands to revolutionise home tening. The cartridge—loaded with ur-track tape—obsoletes existing tape achines, just as the LP record gave e deathblow to the 78 r.p.m. disc.

A tape recorder has been designed ound the cartridge—a domestic port-le machine that can RECORD on two annels where nearly all existing tereo" machines can only record mon-rally and playback stereo. The new achine, due in the shops at the end the year, is priced competitively with rrent recorders.

But the big news is the cartridge it-lf.

The drawbacks with recording tape on els have been:

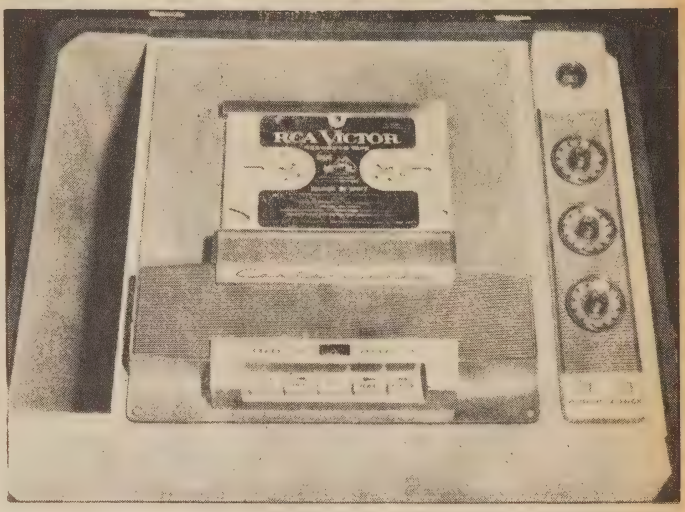
High cost, compared with disc cords.

Feeding the tape into the recorder is ksome, again compared with the ease placing a record on a turntabl .

Frequent tape breakage, due, usually, improper tape feeding.

Short listening time of tape record-gs.

The new tape cartridge aims to change that.



Photograph of the RCA Tape Player. The new cartridge is shown in place in the centre of the panel.

Here the tape is wound inside the cartridge (much like the film magazine for movie cameras) rather than on the conventional reel. The cartridge is a flat rectangular plastic box measuring 5in x 7in. The tape is wound on two hubs, inside the cartridge, which fit over the tape recorder's capstan spindles. Guides inside the cartridge feed the tape—in a straight line—through five gaps where it is to pass the record, playback and erase heads of the reproducer.

In use, the cartridge is simply slipped on to the capstan spindles and the start button is pressed. It's as simple as placing a record on a gramophone.

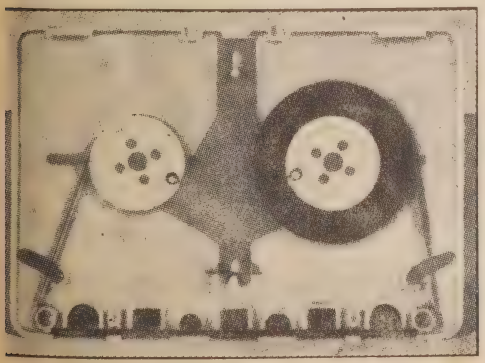
To keep the cost of the cartridge down, RCA decided to use a low playing speed to get more program material on a given length of tape, and to record on four tracks instead of the usual two, to get still more time to the same length of tape.

The recorders designed for the cartridge play at 3¾in per second. And they have a frequency response flat from 70 to 15 kcs.

When RCA started to work on the cartridge idea four and a half years ago, no recording heads that could give such a wide response at that speed were available. So their engineers designed their own. The heads are of dual construction with .136in spacing, centre to centre.

Standard tape is used in the cartridge, but the track width is but .043in with .025in separation between tracks.

In an A-B test by R.C.A. engineers of the cartridge recorder playing at 3¾ ips. alongside a similar reel-model playing at 7½ ips., no difference in the signal could be detected aurally. They didn't find any crosstalk in the four-track tape, either.



Inner view of the cartridge showing the spools threaded with tape.

CARTRIDGE LOADING

On the automatic player, the cartridge is placed on top, face up, and tracks one and three provide the right and left hand stereo channels. At the end of the tape, the machine automatically reverses to play tracks four and two for the rest of the program. If the tape is used monaurally, the automatic recorder reverses three times to play each of the four tracks in correct sequence.

The company is also making a semi-automatic machine where the cartridge has to be turned over manually after one side has played.

Speakers in the recorder are for one channel. An auxiliary speaker has to be used for the other channel and the company recommends any good-quality speaker will be adequate for the stereo channel. Three speakers come with the machine, an eight inch and two 3½ inch units.

Price of the recorders in the United States will be 450 dollars for the automatic model; 300 dollars for the semi-automatic. This is roughly the same

PHILIPS

4-speed Automatic push-button multi-function record changer*

PHILIPS

Type AG1014

PRICE
£25.18.0
240 Volts
50 CYCLES AC

The AG1014 multi-function record changer combines a simple pushbutton record changer with an automatic record player of completely new design. It incorporates the latest technical refinements for simplicity of operation and trouble-free service. The unit is attractively finished in Gold Hammerloid with burgundy tone arm. The turntable is flock sprayed and effectively cushions the records and so avoids damage. Completely automatic, just load up to 10 records (all sizes of a similar speed intermixed), press the start button and forget. The unit cuts off after the last record and, of course, mutes the pickup during the change cycle. The loading arm lifts off for automatic single play operation and the record can be placed directly on the turntable. Select the record size, push the start button and the arm is lowered safely and gently on the record with a precision not possible by hand. Push the stop button and the pickup arm returns to its rest at the finish of the record and switches off.

* Three functions:— automatic record changer — automatic single play — manual single play.

- Push Button operation—Simple and foolproof.
- Detachable dual stylus pick-up head — Hi-Fi sapphire and diamond stylus heads also available.
- All record speeds: 78, 45, 33 1/3, 16 2/3 r.p.m.
- No interfering rumble or wow.
- Plays 7", 10", 12" records of same speed intermixed.

PHILIPS ELECTRICAL INDUSTRIES PTY. LIMITED

Sydney • Melbourne • Brisbane • Adelaide • Perth • Hobart

P.654

ice as reel-type stereo recorders now
the market.

The big saving will be in tape cost. 'ith the cartridge, the price of a stereo cording of, for example, a Broadway ow, will be 8.95 dollars. The same ow in stereo on reeled-tape lists for 3.95 dollars. A blank cartridge will ll for about 3.50 dollars. A 60-min e cartridge carrying a stereo recording ill be 9.95 dollars. These cartridge cordings will be available in America ter this month.

What about tape breakage?

REAKAGES

It can still happen with the cartridge, course, although it is hoped, less fre-ently. But the tape can still be splic-l in the usual way.

The cartridge is made in two halves, p and bottom, and held together by o screws. It takes only a moment, id a screwdriver, to get inside if the pe breaks.

Two United States tape manufacturers ive already tooled for the R.C.A. cart-dge. They are Minnesota Mining akers of Scotch brand tape) and Orr adio. Thus the cartridges will be avail le to other record companies.

When R.C.A. came up with the cart-dge idea, they told other manufactur-s: "This is what we are going to do ith tape. If you want to get on the ndwaggon — come along with us."

Anyone is free to make the cartridges, a player that accepts the cartridge, ithout licence fees, the company said. etailed plans for the cartridge were ade available to any manufacturer in-rested.

At this writing, it is known that the mpex Company are offering a conver-on kit for four-track reeled-tape repro-uction.

R.C.A. plan to continue selling the eled tape, in addition to their cart-dges. "As long as people want to buy els, we'll make them," a spokesman r the company told "Radio, TV and obbies"

And in other fields of stereo sound re-roduction R.C.A. have been quietly aking strides.

IRST RELEASE

A catalogue of stereo discs is already the shops together with a line of ereo gramophones. Even in the 45 p.m. field (which has been a mild em-arrassment to the company) stereo ayers that take only the 7in 45 records e being made. This week, the com any released 27 of their 45 Extended lay discs in stereo, the first stereo 45s vailable in the U.S.

The stereo discs are cut on Westrex thes, of course with the 45/45 degree ooves. They are designed to be play-l with a .7 mil. needle and are com-atible for single channel reproduction n monaural gramophones — as long as ey are played with the .7 mil. needle. he regular 1 mil. needle for standard onaural L.P.s makes the stereo disc ound like an old Edison cylinder.

For the last three years the company as been recording all their masters on vo channels. In a few months, even lvis Presley might be available in Living Stereo." At 5.95 dollars, just ne dollar more than the monaural disc.

Can you wait?

FIRST STEREO DEMONSTRATION

This photograph was taken at the Westrex stereo demonstration at EMI studios. Left to right—W. E. Kollmeyer, Managing Director of Westrex in Australia; R. V. Southey, Recording Director of EMI; John Moyle, Editor Radio Television and Hobbies; Ron Wills, Manager Artists and Repertoire Division, EMI.

Australian audiences heard demonstrations of the new stereo records for the first time on June 17 and 19, on which dates lecture-demonstrations were given by Mr John Moyle, Editor of Radio Television and Hobbies and Mr Len Wiseman, Chief Engineer of Western Australia Pty. Ltd.

MR MOYLE'S lecture on the 17th was given to members of the Sydney Audio Society and their friends at History House in Young Street. There was a very large attendance, which allowed standing room only at the back of the hall.

The lecture opened with a brief outline of the principles of stereo using two channel equipment, and the general operation of a record cutting stylus for both lateral and vertical recordings.

Mention was then made of the various methods currently used for making stereo records, — the lateral-vertical method, the now standard 45/45 system, the Columbia system which uses the vertical channel for recording the difference signal, and the Minter system, in which the difference signal is handled by a frequency modulated carrier of 24 Kc nominal frequency.

The final part of the lecture considered the 45/45 system in more detail. It was illustrated by block diagrams and a blackboard model to show how the two movements of the stylus are combined to trace the required groove in the recording disc.

EQUIPMENT USED

Demonstrations were then given with two high-powered amplifiers and speakers, and also with the smaller amplifier which was described in our July issue.

The pick-up was an Acos crystal, mounted to a motor made by Commonwealth Electronics. The large amplifiers were two 17-watt Playmasters using EL-37 output valves in ultra-linear push-pull. Each was connected via a control unit, one using a single 12AX7, (Playmaster Control Unit No. 4) and the other a unit using two EF86s. (Control Unit No. 6). The two sets of equipment were balanced for over-all gain and compensation in order that the control settings could be kept reasonably in step without ganging.

The big speakers were a pair of Goodmans 325 three-unit types spaced about 15ft apart.

The smaller amplifier used two single-ended EL84s, a common power supply, and ganged controls. The output of each channel was a little over 4 watts, and this proved adequate to cover the hall on a quiet programme. The speakers used with this amplifier were two 8 inch Axiettes spaced about 12ft apart.

The demonstration included a special record made by Capitol on which were recorded sounds of street crowds, a bowling alley, railway trains, moving traffic, popular music including vocalists, electronic organ and full symphony orchestra. Then followed some of the first stereo records issued in U.S.A. including more railway engines, vocalists and a Dixieland band, all Audio Fidelity discs. Some selections from a special demonstration record made by Pye were also played.

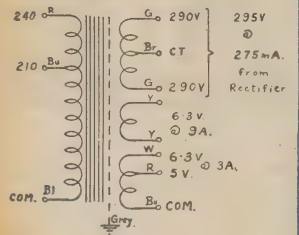
The Westrex demonstration two evenings later was held in the E.M.I main recording studio, Castlereagh Street and featured a paper prepared by Westrex engineers and read by Mr Len Wiseman. It was followed by a programme very similar to that used for the Audio Society, but using Western equipment.

This combination produced some extremely fine sound quality.

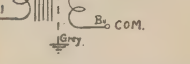
National's research and experience give you the benefit!

Designed for Your Economy TV SET

TRANSFORMER RHE-275/290
Dimensions (upright mounting)
4½" x 3¾"
Chassis height 4¼"



CHOKE RHE-1/275
Dimensions
Height 1⅞"
Coil Width 1⅝"
MTG. CTRS. 2¾"



ECONOMIES IN DESIGN

NATIONAL has designed TV transformers which can be mass-produced yet will still include the following technical features — Low flux density, thus reducing interference to picture tube . . Electro-static shield minimises line pick-up . . . Copper strapping reduces external field . . . Rolled-edge holes in cover prevent chafing of leads . . . unique lead anchoring inside the winding prevents leads being pulled out . . . Louvres and vents give maximum cooling . . . Low temperature rise. Consequently, these economies in design enable further—

ECONOMIES IN PRODUCTION

Being the largest TV transformer manufacturer in the whole of Australasia, NATIONAL'S mass-production facilities are utilised by big-name TV set manufacturers. All NATIONAL transformers pass rigid quality control checks which by specialised techniques enable each unit to be individually tested and compared with a set standard These factors combine to produce the ultimate in TV transformers which are available to the consumer at an—

ECONOMY PRICE

National TV Transformer RHE-275/290 .. 160/6
National TV Choke RHE-1/275 ..... 20/4
Retail—including 25% Sales Tax.

Contact your usual supplier for full details now!

Australian and Overseas Agents:

Wm. J. McLELLAN & CO. PTY. LTD.
126 Sussex St. (Near King St.), Sydney. BX1131

National
POWER TRANSFORMERS
FILTER CHOKES

VICTORIAN AGENTS: Australasian Engineering Equipment Co. Pty. Ltd. 476 Latrobe St., Melbourne. FY2638.

FACTORY REPRESENTATIVES: Queensland: K. H. Dore & Sons, Brisbane. BO268. South Australia: B. L. Andrew & Co. Ltd., Adelaide. W1827. Western Australia: I. W. Holman, Perth. BA8190.

Post this coupon to-day

Please forward details for National Economy TV Transformer and Choke.

Name .....

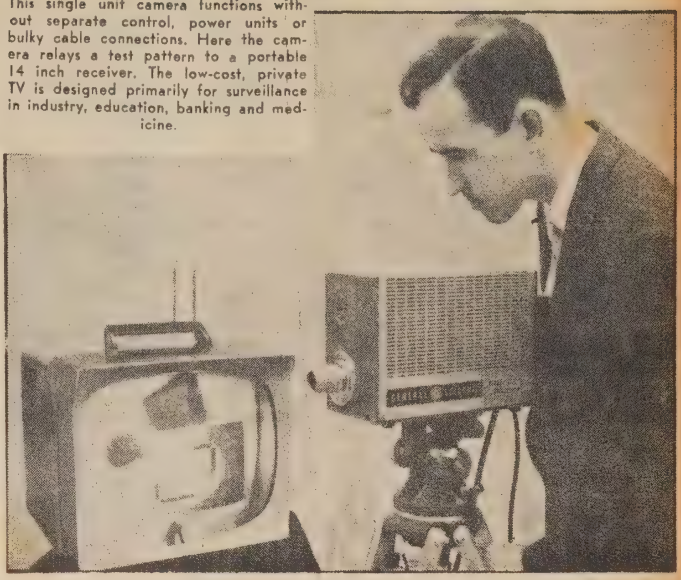
Address .....

Supplier (optional) ..... August

SMALL TV CAMERA FOR INDUSTRY

IT WEIGHS ONLY THIRTEEN POUNDS

Closed circuit television systems have long been at work, using small TV cameras, for a 'round-the-clock' surveillance job for industry, education, medicine, banking, and certain defence areas. A colour closed-circuit system tracked the launching of the Explorer satellite. General Electric has developed a small, single-unit TV camera which operates without separate control power units, or bulky cable connections.



This single unit camera functions without separate control, power units or bulky cable connections. Here the camera relays a test pattern to a portable 14 inch receiver. The low-cost, private TV is designed primarily for surveillance in industry, education, banking and medicine.

RECOMMENDED applications include atomic assembly, materials handling, fire detection in factories and forest preserves, wind tunnel tests, scrap loading in railroad cars, traffic control, and a host of others.

Designated the TE-6-A, the new camera will be available in three specific types. Model 4TE6A1 includes an integrated control panel; model 4TE6A2 includes an integrated systems panel; and model 4TE6A3 also includes a systems panel and is used with an external synchronising generator and systems panel.

The TE-6-A camera, depending on the model, weighs from just over 13 pounds, to slightly more than 15 pounds, and measures 7 13/16 by 12 3-8 by 5 1-8 inches. Its case consists of four castings: two end plates, a base and a lens holder. A perforated, three-sided aluminium cover fits snugly over the case. All wired-in chassis components are easily accessible for testing and maintenance through removal of the cover. Also, the end plates and lens holder can be removed for inspection.

CAMERA FEATURES

The television camera line offers these features: Regulated vidicon focus which assures a resolution of better than 300 lines over line voltage changes ranging from 100 to 130 volts; crystal-controlled RF generator which minimises tuning readjustments and makes possible filtering and audio-mixing in multi-channel systems; transistor L-C oscillator which permits stable horizontal scanning and lessens the drift problem in multi-camera installations; and a basic control panel which can be remoted up to 1,000 feet. With accessories the TE-6-A can be controlled from distances up to a mile.

A "gain" control permits adjustment of sensitivity for efficient signal-to-noise ratio on scenes of high brightness. The TE-6-A camera affords a clear image down to two foot lamberts of scene brightness, and has safety provisions which include an A-C input fused to the rear panel, and a three-pronged A-C line cord for positive grounding of the case.

In operation, the new camera functions well over a range of ambient temperatures from 0 deg. C to 50 deg. C. depending on the vidicon used.

In scanning, models 4TE6A1 and 4TE6A2 use 525 lines, 60 fields, and random interlace. Their vertical frequency is 60 CPS as locked to electrical outlet. The horizontal frequency is 15.75 Kc.

Model 4TE6A3 uses the same rates, but can achieve two-to-one interlaced scanning with an external synchronising generator.

The horizontal resolution is the same for all three models: 400 lines or better. The units have a video band width response to five MC. and develop a sensitivity expressed in a usable picture at two-foot lamberts scene brightness with f1.4 lens and a representative vidicon.

TRANSISTOR 2-WAY RADIO

Another recent GE development is a hand carried two-way radio completely transistorised, reported to be the first in U.S.A. without valves. Its sensitivity is claimed to approach those of currently used equipment.

Newly designed transistor tetrodes are used in the front end.

Transistor No. 3N36, engineered for frequencies up to 100 mc, will be used in the 25-54 mc low-band portable which will be the first to come off the production lines. Units designed for high-band (144-174 mc) will be equipped with Transistor No. 3N37, engineered for use up to 200 mc.

Both transistors were developed under an Air Force contract and are being employed commercially for the first time.

HIGH SENSITIVITY

Sensitivity (0.4 microvolts) will be extremely important in remotely-located areas where communications reception normally is poor. The new units are designed for use in buildings and outdoors but will have their greatest usage in locations inaccessible to radio-equipped vehicles.

The unit's speaker is larger than those usually found in portable equipment, resulting in improved performance and less distortion.

While standing by to receive a message, it drains less power than a small household-type flashlight, but is supplied with large industrial-type batteries as standard equipment.

Although miniaturisation techniques have been used, the chassis has been engineered for serviceability and ease of maintenance.

New, modular construction design is employed in the transmitter, making it easy to remove various stages for replacement if necessary.

Transistors are the plug-in type and may be removed without unsoldering, saving the time of servicemen who make routine inspections of the units.

All tuning points and components are readily accessible.

What could be simpler than boiling water for a cup of tea? Scientists have found recently that there are three different kinds of boiling, of which this tea kettle represents only one.

More To Boiling Than Meets The Eye

Steam from a kettle of boiling water inspired James Watt to invent the steam engine. More recent experiments with hot wires in water have shown that this apparently simple process isn't simple at all. Modern use of devices such as heat exchangers throws great importance on understanding the phenomena of boiling.

Last month I mentioned some of the peculiar lines of research carried out by some scientists. It is difficult at times to find a purpose in some of these experiments except the scientific urge to probe nature into revealing how she works.

There are many experiments however which, although they may seem redundant to the layman, have an inner meaning which could have a bearing on our way of living.

Many an end result lacks the glamour of the experiments which produced it.

Take, for instance, a lump of pig iron. There is nothing beautiful or romantic about this. But the discovery of iron ore and its conversion into pig iron right through the various processes which convert it into the various grades of steel is a remarkable story of chemistry and metallurgy.

So it is with many other everyday things. A repulsive lump of black stone becomes the beautiful metal chromium. A nasty looking fungus becomes penicillin, streptomycin and other life saving materials and so on.

Thus we find scientists probing the forces which have to do with the boiling of liquids, the flowering of plants, the ripening of fruit and so forth.

It is only in recent years that serious consideration has been given to the boiling of liquids. This is due to the increasing high temperatures used in industry particularly in the field of nuclear reactors where temperatures of an extremely high order have to be dealt with.

by Calvin Walters

The terrific heat generated in a r actor must be transferred somewher The removal of heat is of prime in portance for upon it depends the li of the reactor and of those who opera it.

The removal of heat is also of gre importance in jet engines and rock motors.

To refer to boiling water as a coo ant seems a bit of an anomaly yet is boiling liquids which have the grea est appeal to engineers. It has bee established that boiling water can ha heat transferred to it ten times mo quickly than cold water, or 100 tim more quickly than to circulating a

Ever since man discovered fire he h been familiar with boiling water ar thought that there was nothing remar able about it.

No doubt many scientists wonder about it in a casual sort of way b it remained for a Japanese scientis Mr Shiro Nukiyama, to get everyo guessing in 1934.

For some reason or other he decide to plunge a platinum wire into wat and heat the wire with electricity. Th temperature of the wire in the wat was measured by means of its resistanc (the resistance of wire varies with i crease of temperature).

It was found that heat flowed fro the wire to the water at an increasi rate as the temperature increased.

But a remarkable and inexplicab thing (for that period) happened aft the temperature of the wire reached 1 degrees centigrade. Any attempt to i crease the temperature of the wire ev so slightly above 150 degrees caused to suddenly jump to 1,000 degrees. Th wire just couldn't be heated to a fe degrees above 150. It was 150 degre or 1,000. Nothing in between.

At both temperatures the water bo ed and presumably it would boil some in-between temperature also.

The same would have happened pr sumably with nickel and chrome wi but Mr Nukiyama couldn't find out b cause when he attempted to get t wires above 150 degrees they melte having a lower melting point than pla num.

So Mr Nukiyama went on a differe track. He got his platinum wire up 1,000 degrees and gradually reduced t temperature. He was able to get down to 300, but any attempt to g it lower caused it to jump sudden down to 150.

Because of the behaviour of ra of heat flow at the three temperatur —150, 300, and above 300 degrees Mr Nukiyama by devious processes thought concluded that there must three kinds of boiling, one at 150, o above 300, and another between 1 and 300 degrees. He also further dedu that at the temperature between 1 and 300 degrees any increase in t temperature of the wire would cau

decrease of the amount of heat transrred to the water.

Now this won't help us to boil our gs or wash the clothes any better, it it does open up avenues of experient with the advent of nuclear re-tors, jet engines and so forth, for Mr Nukiyama's conclusions might lie solution to the heat transfer problems sociated with them.

Consequently the University of Illiis in U.S.A. went further into the atter in the following manner.

Because the most convenient source heat was the laboratory steam heatg at 100 to 170 degrees centigrade, ethyl alcohol was chosen as the liquid be boiled as this would produce the ree types of boiling if such existed.

A copper tube three eighths of an ch in diameter and 3½ inches long is immersed in a glass container of ethyl alcohol and the steam turned on.

As the alcohol boiled the vapour was ndensed back into alcohol. This served purpose, (aside from the probable sire of the operator not to waste od alcohol whatever form it takes). measuring the heat absorbed in the ter around the condensor the amount heat transferred could be calculated.

This apparatus proved that there are fact, three kinds of boiling which ve been called respectively "nuclear iling", "transition boiling" and "film iling."

Nuclear boiling is the ordinary type ich goes on in the kettle on the stove. can be better observed when taking ace in a shallow frying pan. If you ok at it after reading this article suming you have got this far) it will ve greater interest.

You will notice that as the temperare increases, bubbles form on the hot tal surface and break away. Immedizly this happens another bubble forms exactly the same place and while bottom of the pan seems to have cite a number of these spots where bbles form other parts of the bottom ve no bubbles on them at all.

MYSTERY

This in itself is a mystery because noldy knows why bubbles form in sected spots in this way. They have en called "active points" and are ought to be due to a minute impurity the metal or a slight microscopic ughness.

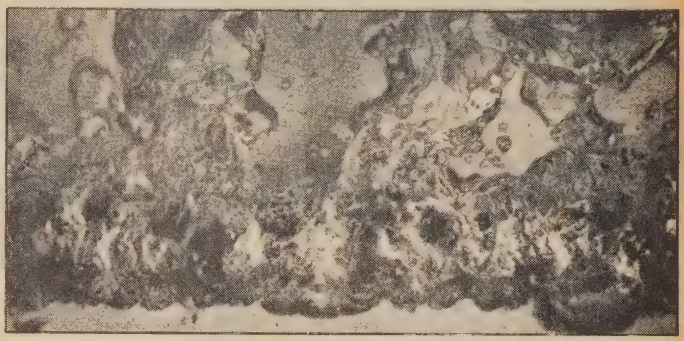
Another peculiar thing can be obsved in that if the gas is turned up, is raising the temperature of the tal, new active points come into acn, while if the temperature is lowerc some of the original active points p working. The number of active ints in operation govern the amount c heat transferred from the hot metal the liquid.

The greater the number of bubbles greater the amount of heat transred because the stirring caused by bubbles assists the transfer of heat. the point where the greatest amount c heat is transferred the whole surface c the bottom of the pan is emitting bbles.

This is the explanation why boiling uids are of such value in the transf of heat. Cold water merely absorbs at by conduction and convection vich is a slow process, but boiling

PICTURES REVEAL THE SECRET

In a glass tank filled with methyl alcohol, Nuclear boiling is shown, photographed at one millionth second exposure. The copper tube which runs through the tank shows that bubbles form at the same points on the surface.



Higher temperatures are needed for Transition boiling. Bubbles of vapor form almost explosively, entirely covering the tube surface.

Highest temperatures cause Film boiling, surrounding the tube with a transparent film of vapor. A set of bubbles is about to break away from the tube in this picture.

water takes the heat away in the rapidly rising bubbles which burst into the open air, carrying the heat away with great rapidity. In addition the rising bubbles cause a stirring, and augment the convection currents formed in the liquid.

There has to be a temperature difference between the metal surface and the liquid for the maximum transfer of heat. This temperature difference varies from 10 to 60 degrees according to the liquid and the metal.

The stage of transition boiling cannot be easily seen in a frying pan but is discernable in the apparatus with methyl alcohol.

As the temperature of the metal tube is increased the rate of boiling is increased and the bubbles almost completely cover the heated surface. At this stage the bubbles join together and form a continuous sheet over the metal.

There are no longer any specific active points but rather do the bubbles form at random over the hot metal. They are so numerous that they form a film of vapour over the metal so that the liquid is kept away from the metal by the violent ebullition.

Thus the vapour covering the tube acts as a thermal insulator between the tube and the liquid. There is a diminution in the rate of boiling and heat transfer.

The final stage of "film boiling" occurs when the insulating blanket of vapour around the tube is so thick that very little heat is transferred across it to the liquid. The generation of vapour and the transfer of heat is now at the lowest.

It has been established that the maximum transfer of heat takes place at the border line between nuclear and transition boiling.

A simple experiment described by

VALVE TESTER MODEL TVT.

This is the latest in valve testers and is flexible over a very wide range allowing all types of tubes to be tested irrespective of their pin connections. Individual lever switches are used for every pin, and a range of twenty filament voltages allow all types of tubes to be tested quickly and accurately. It is designed for ordinary radio use as well as for testing TV tubes, and can be used as a portable instrument or bench instrument.

TWO FAMOUS UNIVERSITY
RADIO/T.V. TEST INSTRUMENTS

VALVE AND CIRCUIT TESTER MODEL TST/2

The Model TST needs no introduction to the radio and TV service industry in Australia, and Model TST/2 is built on the same basic principles of good quality and lasting service, but with improvements to allow testing of TV tubes and to give it a more flexible range than TST. As well as having all the features of Model TVT valve tester, it allows AC/DC and output voltages to be checked up to 1,000 volts, together with a range of D.C. current up to 250 milliamperes and self-contained resistance ranges up to 10 megohm. Designed to operate from A.C. it is supplied with instruction booklet and test leads.

UNIVERSITY GRAHAM INSTRUMENTS PTY. LTD.

5 NORTH YORK ST.,
SYDNEY. BU3169.

MAIL THIS COUPON TODAY!

MAIL THIS COUPON TO:
UNIVERSITY GRAHAM INSTRUMENTS PTY. LTD.
5 North York Street, Sydney. 'Phone BU3169.

Please send me details of .....

NAME .....

ADDRESS .....

.....

osworth demonstrates some of the bove facts.

A small block of copper is heated) a dull red and dropped into cold lcohol. The high temperature difference nmediately causes the copper to be- ome coated with a sheet of alcohol apour. This is sheet or film boiling nd the alcohol boils very quietly. The oiling alcohol cools the copper until stage is reached when film boiling replaced by nuclear boiling. Here a idden increase of ebullition takes place. oiling is more violent and the copper ols more rapidly until boiling ceases

This illustrates the apparent anomoly iat boiling is more violent at lower mperatures rather than high, caused y the lack of the insulating blanket vapour at the lower temperature.

Film boiling is the principle involved quenching operations during metal- rgical processes. This quenching is rried out by plunging the metal at a gh temperature into a liquid which is a boiling point well below the ini- al temperature of the metal. The opera- on causes a change in the structure the metal. Different temperatures and fferent cooling liquids give varying re- lts, and the science of quenching is dowed with a vast amount of infor- ation as to the requirements for chang- g the structure of the metal for dif- rent purposes.

Film boiling is what takes place when drop of water is allowed to fall on red hot plate. It runs and spits around over the place and evaporates very owly because it is kept away from the ate by a film of vapour. It thus takes nger to get hot enough to evaporate an a drop of water on a moderately t plate, where it undergoes nuclear iling and is in direct contact with e plate and evaporates more quickly.

UITABLE METALS

Some research has been entered into garding the properties of various met- s in relation to their suitability as lilers.

It has been found that rough sur- ces give an inital higher boiling rate an smooth. This effect becomes less ter some use and as the absorbed air i the metal is removed. Grooved sur- ces have been used with the claim tit they give a higher boiling rate. lowever after they have been in use f some time they give the same boiling re as a smooth surface of the same rtal.

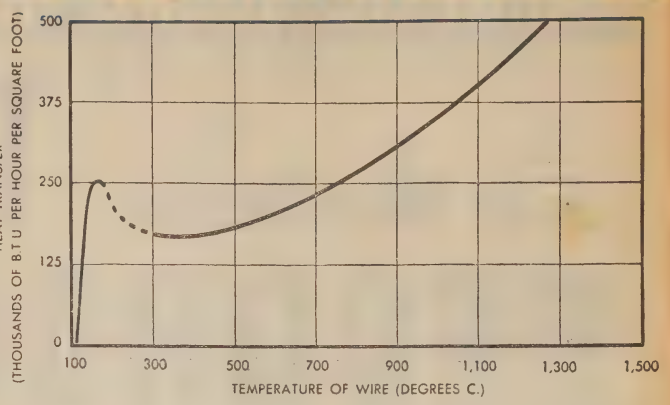
It appears that the degree of wetting c the surface of the boiler has some iluence on the boiling rate. For in- snce a trace of mineral oil on a steel iler will retard the boiling rate com- red with a piece of wetted steel at t same temperature.

Chrome plate is difficult to wet and trefore vessels consisting of chrome te will have a lower boiling rate tn most other metals.

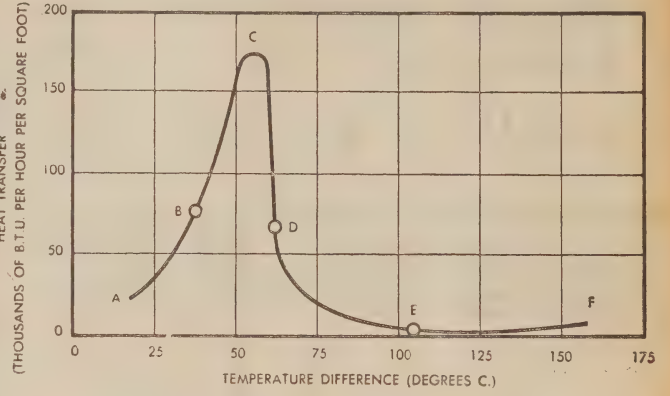
Wetting agents, now in common use f washing clothes, have a useful func- tn in that their presence in the family oper can increase the rate of boiling b as much as 20 per cent merely be- ise they cause wetting of the copper sface more readily. They also increase tl heat transfer ratio from the copper

(Continued on Page 27)

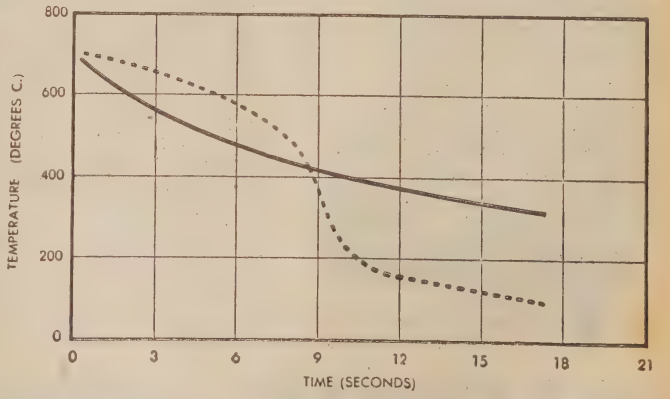
HEAT GRAPHS PROVIDE FIGURES



Original water curve produced by Shiro Nukiyama. It shows the amount of heat transfered from a hot wire to the boiling water. Note the jump at 150 degrees.



Methyl alcohol curve showing Nuclear boiling (A to C), Transition boiling (C to E), and Film boiling (E to F). Photographs on page 17 were made corresponding with points B,D,E. The temperature difference is between the tube and the boiling alcohol.



Metal curve can be explained by the three different kinds of boiling. The solid curve represents the rate of cooling of a one-inch steel bar quenched in a non boiling liquid. The peculiar dotted curve represents the rate of cooling of a bar quenched in a boiling liquid.

MAGNETIC SOUND INDUSTRIES

Four New-Release TAPE RECORDERS

On Show at Magnetic Sound

1. PHONO-TRIX

The new Phono-Trix is a masterpiece in miniature tape recorders. It's a self-contained power unit, which makes it ideal for work in the field. Ordinary 1.5 volt torch batteries which last for 50 hours power the Phono-Trix, giving a recording time of up to 75 minutes. Twin tracks, rapid rewind and fully automatic volume control on record, with automatic erasure during recording. Phono-Trix is in a smart pigskin carrying case, and measures only $10\frac{1}{2}$" x $5\frac{1}{2}$" x $3\frac{3}{4}$". Price is £79/19/6.

2. WALTERS

This low-priced English tape recorder is perfect for home entertainment. It weighs only 19 lbs, has $1\frac{1}{2}$ hours playing time Frequency response 40-10,000 cycles, large inbuilt loudspeaker, single knob operation for added simplicity, smart 2-tone carrying case. Ideal for speech and music, only £79/10/-.

3. GELOSO

Latest Continental Tape Record from Italy. Weighs only 8 lbs., speeds, press-button operated. Giv wonderful reproduction. Comple with tape, high-grade microphone a zip carrying bag, £89/10/-.

4. TELEFUNKEN

One of the world's really fine ta recorders, imported from Germa Press button operated, high fideli recording. A machine for the enthu ast. £165.

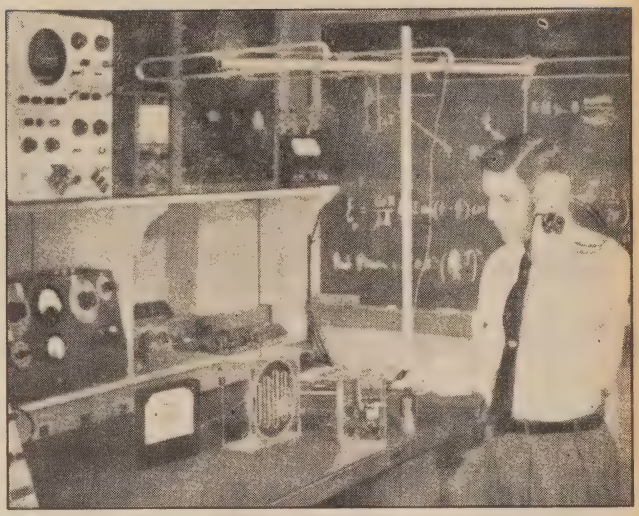
MAGNETIC SOUND INDUSTRIES (AUST.)

STREET LEVEL, Bisley House, 387 GEORGE ST. PHONE BX4440 or BX4587

Technical Review

ADIO WAVES OWER RANSISTORS

he idea of "free" power for ransistor sets, derived from the tation being received or other tations, has been suggested reviously as a novelty. How- ver, this article suggests that he idea might have a more ractical application, both for ivilian and defence purposes. is even suggested that power ight be deliberately radiated operate such equipment over a limited range.



The author of this article tunes the information circuit of radiation-powered transistor receiver. Operating voltage for information and audio amplifier circuits is provided solely by RF energy extracted by and stored in power circuit.

an energy storage system which ilies all power requirements for pially designed transistor circuits, oper- ita consists of receiving and rectifying Radiation, storing resultant DC energy n releasing the energy as required to sociated circuits. A unique dipole ctfier provides efficient antenna to ctver coupling for frequencies above .0 nc; Energy sources can be special purpose transmitters or commercial broadcasting stations.

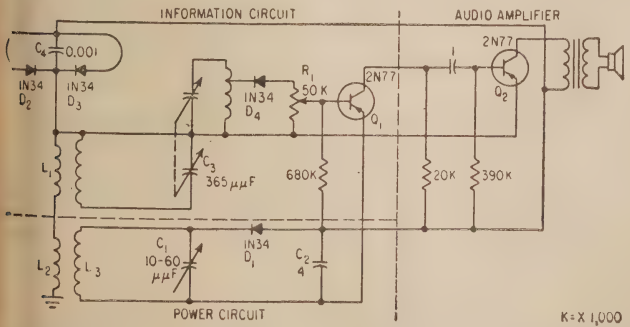
Rapid acceptance of transistors is largely the result of their low voltage and current requirements — a few micro-watts being sufficient power for many applications. The system discussed here derives all power required to operate various types of transistor circuits from electromagnetic energy radiated by distant sources.

Although system details depend somewhat upon the intended application, certain design features are common to any application. These are: One or more circuits for the reception and storage of electromagnetic energy, a circuit for the detection and amplification of an information signal and a load to use the stored energy.

A transistorised receiver using a radiant energy power circuit is shown in Fig. 1. All input signals are applied to information coupling coil L1 and power coupling coil L2 simultaneously; however, each circuit can be tuned to the same or different operating frequencies.

After being detected by a parallel resonant circuit consisting of coil L3 and variable capacitor C1, the incoming R-F signal is rectified by diode D1 and the resultant D-C voltage applied to storage capacitor C2. When charged, capacitor C2 becomes the sole power supply for the receiver.

The storage capacitor should be of the high quality, low-leakage type. For maximum power absorption and use, the



F. 1.—Broadcast receiver. Specially constructed tuning coils are used but can E replaced by standard coils. Antenna and power circuits are designed to operate at all communication frequencies.

U.R.D. for Hi-Fi

Vast and varied stocks enable United Radio Distributors to deal with all orders more promptly than ever before. Write, 'phone, telegram or visit — you'll find the service prompt and the advice helpful.

U.R.D. for radio, TV and electrical appliances as well as everything you need for High-Fidelity reproduction.

PICK-UP

Connoisseur. Downward pressure 5 grams. Frequency range 20 c/s to 20 k.c.s. This is the unit for Hi-Fi enthusiasts.

The Black Shadow. A new concept in crystal pick-up design. ACOS present this new pick-up as a further development of the now famous H.G.P. 40. Response flat to 18,000 c.p.s.

M. B. H. A sound investment in Hi-Fi sound. Wide frequency range — low distortion — high output and a fidelity that lasts.

MOTOR

Connoisseur. Hand-built synchronous transcription motor, non-ferrous turntable, 4% variable speeds by mechanical means, phosphor-bronze bearings

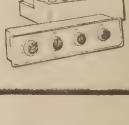
Goldring Lenco. Continuously variable speeds from above 78 r.p.m. to below 16 r.p.m. A true High Fidelity transcription unit.

Garrard 301 Transcription Motor. Supreme in its class, incorporates details appreciated by experts. Includes variable speeds by eddy current brake

AMPLIFIER

Quad II sets a new standard in Hi-Fi reproduction. Without doubt the world's finest amplifier. Matching AM and FM tuners also available

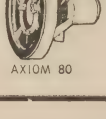
Rogers RD Junior. Since it was first introduced, the RD Junior has achieved and maintained world leadership in the medium-priced amplifier field.



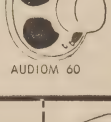
Aegis Mullard 510. Australian made, a very fine low-priced amplifier. Matching tuners also available.

SPEAKER

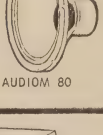
AXIOM 300



AXIOM 80



AUDIOM 60



AUDIOM 80

AXIETTE

GOODMANS SPEAKERS. The Goodmans range of High Fidelity loudspeakers is so varied that it can provide every possible combination in speaker systems. Also crossover networks and Acoustical Resistance Units

CABINET

Axiette Cabinet. Specially designed to carry the Goodmans Axiette speaker Height: 24 inches Plans available on request.

Sherwood Cabinet. Designed for the Goodmans Axiom 12" loudspeakers, used with or without the Trebax high frequency unit

325 Reproducer: Complete multi-unit Hi-Fi loudspeaker system. Carries 3 speakers: Trebax treble unit, Midax mid-range unit and Audiom 60, 70 or 90 Bass units.

UNITED RADIO DISTRIBUTORS PTY. LTD.

175 Phillip Street, Sydney. Telephone BW 3718, BL 3954

UNITED RADIO DISTRIBUTORS PTY. LTD
175 Phillip Street, Sydney

Please send further information about the equipment illustrated in your advertisement, particularly

_____

To: Name _____

Address _____

_____ RH/8/58

ver circuit should be broadband tuned, tly oupled to the antenna and im- lance matched to the load. Additional age circuits, tuned to the same or erent signal sources, may be used to ain increased power at a common put.

or signals below 50 mc, a conven inal antenn 50 to 150 feet long, ele- ed as high as possible and positioned pendicular to transmitter-receiver line sight is recommended.

A radiant energy power circuit fed by 00ft antenna which was 12ft above ground, in a suburban area and ap- ximately 1½ miles from a 1 kw. 1,600 transmitter delivered 0.9 mw to a 0-ohm resistive load The open cir- potential across the storage capaci- was five volts. A large loop antenna one side facing the transmitter is recommended.

or signal sources above 50 mc, a nant folded dipole rectifier system is d Functionally, the antenna system rates like the centre-tapped secondary ding of the transformer in a full wave ifier circuit. This is done by con ting two output terminals of the dipole ctly to the cathodes of individual e rectifiers as shown in Fig. 1. The anodes are tied together and coupled he zero potential point at the back of folded dipole through an RF filter acitor

RSONANT ANTENNA

ince diodes D2 and D3 form a par ly reactive load, the antenna is de- ed to resonate at the desired fre- ncy with the rectifier circuit in place. ause the RF potential across capacitor C is essentially zero, unmatched lines n be used to draw DC power without ning the antenna. High rectification fficiency is necessary; therefore, the di- es should have a low capacitance, high ard resistance and low forward resist- ce.

everal radiant energy power dipoles a be connected in series or parallel to ease DC voltage or current as re- ed.

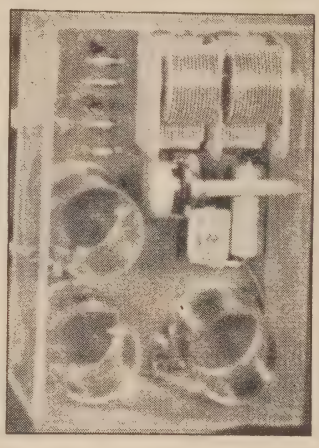
hen such a multiple system operates the same RF signal frequency, the ennas must be properly spaced for aximum system gain. An experimental angement using three dipoles is shown Fig. 2.

n array of three series-connected n-unit dipoles feeding the same load elered a total of 3 mw and charged a two microfarad capacitor to 54 volts. Since a lower voltage was desired for transistor circuits, the units were connected in series and parallel across the capacitor to obtain an 8-volt potential

DIODE DETECTOR

Information-receiving circuits shown in Fig. 1 can be tuned to the power signal frequency or to some other selected frequency. In either case the modulation of an incoming signal is detected by diode D4 and fed into transistor amplifier Q1. Basic information circuit requirements are high selectivity, low power drain on the capacitor with zero input signal and efficient energy transference to the load.

High-Q circuit elements should be used to provide high selectivity When the same antenna is used for both power and information signal reception, all signals should have similar magnitude at the amplifier input. To avoid saturation and distortion of the signal in a high-gain amplifier, the signal having the greatest field strength at the receiver is attenuated by absorbing most of the signal strength in the energy collecting circuit. Selectivity can also be increased by trapping strong signals occurring near the desired information frequency being transmitted.



Dual-circuit receiver shown here converts radiations from strong local stations into power necessary to amplify signals from weaker or more distant stations When both the information and power circuits are tuned to the same station the signal is amplified by the power derived from the station's RF carrier.

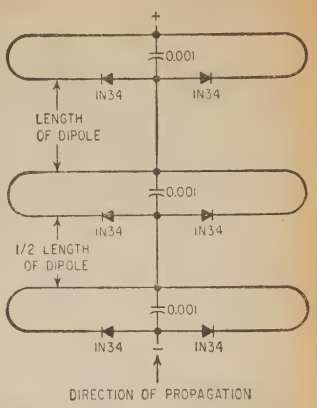


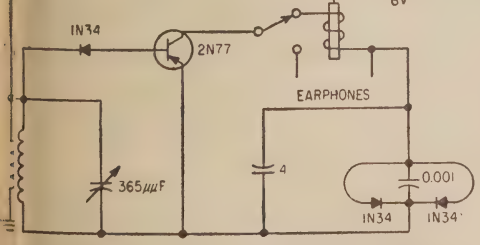
Fig. 2—Multiple dipole antenna. This combination delivered one milliwatt to a 2,500-ohm resistive load when tuned to a 189 mc, 50 kw transmitter located approximately one mile away. A similar array was capable of producing a total of 3 mw of power and charging a 2-uf capacitor to 54v

SWITCHING CIRCUITS

In switching circuit applications, transistor Q1 is biased for the lowest collector current which will operate the load device with a given signal input. A minimum leakage current is necessary for maximum efficiency of energy storage and use.

Large zero-bias collector current limits the capacitor charge and precludes use of low-current relays which are desirable in certain applications. To further conserve power, audio amplifier Q2 should be operated class A at the minimum collector current.

An unmodulated carrier, transmitted at the resonant frequency of the power



F 3—Emergency receiver and alarm device By pretuning information circuit to Conelrad's 640 or 1,240-kc emergency frquencies, civil defence broadcasts can be received regardless of availability of local power sources

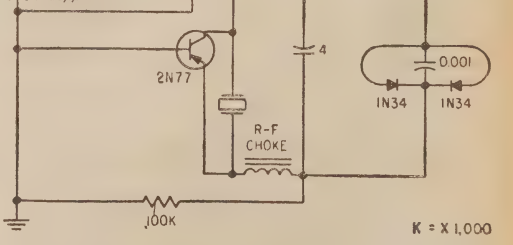
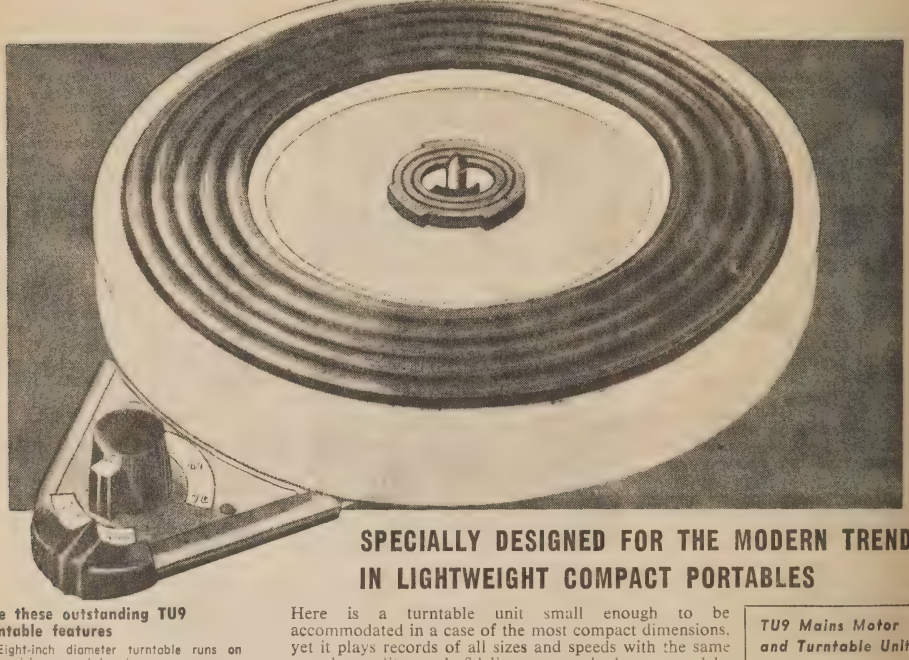


Fig. 4—Transponder Power received at some specific frequency is used to energise the transistor oscillator at a different frequency thereby making it useful as a device for detecting position of aircraft or any other object capable of housing such a device

NOW . . . BIG PERFORMANCE in the SMALLEST SPACE!

NEW BSR TU9

4-SPEED TURNTABLE UNIT AND PICK-UP



SPECIALLY DESIGNED FOR THE MODERN TREND IN LIGHTWEIGHT COMPACT PORTABLES

Note these outstanding TU9 Turntable features

1. Eight-inch diameter turntable runs on precision-ground bearings.
2. Powerful, silent-running new BSR 2-pole motor, virtually "WOW" and rumble free.
3. Speed change from 78 to 45, 33⅓ or 16 r.p.m. simply and instantly effected.
4. Independent on/off-switch automatically disengages jockey pulley from main drive pulley in the off position.
5. Fitted with cushioned rubber turntable mat to protect records.
6. Suitable for 50-cycle A.C. mains

The TU9 Pick-up Arm gives amazing PERFORMANCE ***(suitable for both mains and battery units).***

- Fitted with specially designed mounting which virtually eliminates possibility of acoustic feedback.
- Stylus pressure can be adjusted easily, quickly.
- Fitted with BSR Ful-fi crystal cartridge, type TC8M, which was designed to meet the increased demand for a high-output turnover-type cartridge suitable for use with the low-gain amplifier now popularly used in portable record players. **Price, £4**

Here is a turntable unit small enough to be accommodated in a case of the most compact dimensions, yet it plays records of all sizes and speeds with the same superb quality and fidelity as much larger models. Beautifully styled, lightweight and robust, the TU9 Turntable Unit is foolproof in operation . . . designed specifically to meet the modern demand for portable record players.

TU9 Mains Motor and Turntable Unit
PRICE
£7/10/-

SPECIAL! THE BATTERY-OPERATED TU9/D FOR TRANSISTOR PORTABLES

- Suitable for all transistorised and other battery-operated record players.
- Amazing performance with low current consumption.
- Recommended for use with 6-volt batteries.

Battery-operated TU9/D
PRICE
£9/10/-

Obtainable from leading radio retailers. Trade enquiries to the Australian Distributors:

GOLDRING ENGINEERING (AUST.) PTY. LTD., 449 Kent Street, Sydney. Telephone BX 1275/

nal receiving circuit, will continu-sly charge the storage capacitor. Re-te switching of power is accomplished t triggering the transistor amplifier h a modulated power signal or with nodulated signal transmitted on a sel-ed control frequency

Amplifier output, in most applications, connected to a current actuated de-e such as a relay, headphone or ldspeaker. When modulated trans-ssion ceases, power output to the d also ceases.

Substitution of a transistor oscillator the information signal circuit per-s DC to be converted into AC of selected frequency having high-volt e pulses. By applying the oscillator put to a step-up transformer, a high-voltage is developed which can be tified and stored in a capacitor A akdown diode placed between the rage capacitor and the load could used to dump the capacitor charge oss the load when the required volt-level is reached.

MOTE SWITCHING

A large number of unpowered trans-rised radio receivers, pre-tuned to ected frequencies for power and in-fmation, when distributed within ge of a power radiating source could simultaneously activated by turning the transmitter. This arrangement ld be useful in public address, alert-in or civil defence alarm systems.

A circuit for an emergency receiver alarm device is shown in Fig 3. Vhen a signal is received, the control vitch applies power to an alarm. Dur-in the long standby time, no power is drawn from the battery source.

ignals other than modulated RF can be used to trigger the switching device. Fi example, the output of a magnetic-ype microphone energised by a car hon can be used to operate garage der controls.

TANSPONDER

Another application of the energy stage principle is in the transponder cuit shown in Fig. 4. This device ca be used to identify and indicate th position of airplanes, harbour buoys ail markers and the like

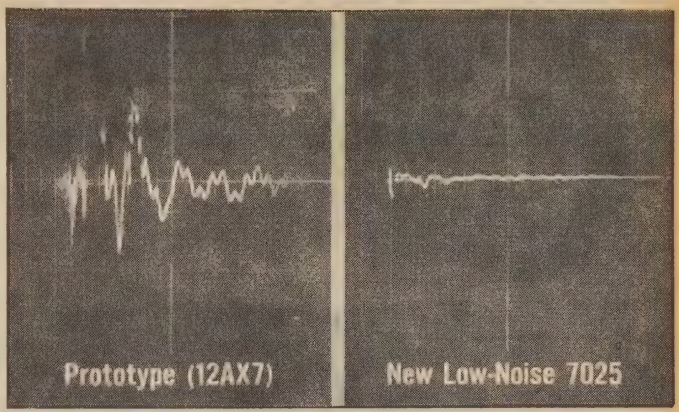
ddition of a microphone to modu-ay the output of the oscillator extends th applications to short range reception an transmission used in wireless inter-communications public address and othr systems Also, the microphone could be energised at a remote location an used as a concealed listening device

y using a small receiver fitted in-ick the ear in conjunction with a fixed uld vest pocket transmitter the de-vic could be used as a personal radio or hearing aid Transmitter output cold be modulated by a microphone or hearing aids and by a simple radio receiver for personal radios

any applications may occur to the eer within his own special field of nterest. Further research, coupled with pecial-purpose component design will undoubtably extend present applications

—Electronics.

LOW NOISE 12AX7 FOR AUDIO WORK



Test comparison between the old and the new. A single, identical tap was applied externally to a 12AX7 and to a 7025 both representative tubes from current production. Vertical measurement is plate voltage , horizontal measurement is time. Conditions: Eb: 250 v Rl: 10 K, Ec:—2.5 v

THE twin triode type 12AX7 has found innumerable uses in audio circuits, in which it naturally falls into high-gain designs. As such, it has frequently been criticised for vulnerability to microphonic troubles.

Several attempts have been made to make construction more robust, and considerable success has been achieved by G.E. with the 7025, produced especially for high-gain audio work

This new twin triode promotes hum free, noise-free reproduction of both disc and tape sound recordings.

In equipment now being designed or in production, the 7025 will directly replace Type 12AX7

The new 7025 features a spring snubber mica applied to the top of the cathode, which exerts a damping effect on any movement of the cathode caused by shock or vibration This cuts microphonics substantially

Also, a new tube heater of special design reduces hum by virtually eliminating heater magnetic influences on plate current and consequent hum in the plate circuit.

High-precision manufacture has achieved extremely close fits of all tube parts—a third important factor in low noise performance

NEW RECHARGEABLE TRANSISTOR SETS

Two new all-transistor portable radios, designed to play a minimum of five years on a single rechargeable battery, and a cordless transistor table model have been announced by RCA Victor.

SPECIAL battery rechargers will be marketed as accessories to the new portable radios. The rechargers, in effect, transform the portables into AC models while the batteries are being recharged.

In addition to operating on the new rechargeable batteries, low-cost penlight or long-lasting mercury cells may be used — thereby assuring the customer of always being able to purchase batteries wherever he may go

The budget priced radio, the Transicharg Super at 39.95 dollars, features six transistors and two crystal diodes—an increase of two transistors over a previous model at the same price

The Transicharg Deluxe at 49.95 dollars offers two-toned styling and a handy carrying handle. It operates on seven transistors and two crystal diodes.

The first of the new Transichargers is designed for use with a new RCA rechargeable battery and when used as directed will power that battery for a minimum of five full years The charger plugs into common house current and the set plugs into the charger which is designed as a useful radio stand

Suggested retail price for this Transicharger, complete with rechargeable battery is 14.95 dollars. If purchased with the radio it will be 10 dollars.

The second Transicharger, designed for the two new sets, in addition to charging the battery, will permit playing of the radio while the battery is being charged and channels the sound into a big table radio speaker It costs 24.95 dollars or 17 dollars when purchased with one of the new radios.

Neither of the new Transichargers will cause damage to the battery because of overcharging

An all-transistor cordless table radio, The Starliner, is ready for release. It slips easily into a bookcase or room divider and has a concealed band-grip for portability.

Featuring a powerful 4in by 6in permanent magnet speaker, it will play approximately 1500 hours (1½ years at 20 hours a week) on one battery pack.

The set operates on seven RCA transistors and one crystal diode and cost 69.95 dollars.

COLLARO

FOR FIDELITY IN REPRODUCTION
IN STUDIO OR HOME

4- SPEED GRAMOPHONE TRANSCRIPTION UNIT MODEL 4T200

Entirely new type 4-speed mechanism (16⅔, 33⅓, 45 and 78 r.p.m.) ensures absolutely uniform speed, with reproduction free from frequency modulation! A very heavy turntable is fitted with a ground and lapped spindle running on to a ball which takes the total thrust of the turntable, and results in correct speed with no detectable "wow" or "rumble".

The "Studio" transcription arm fitted is of tubular metal which has a very low resonance, and is so designed as to be capable of playing 16 in. records. Any type of "Studio" turnover crystal cartridge can be fitted. Model 4T200 can also be supplied without pickup.

GRAMOPHONE UNITS

The AC4/564 — a reliable and moderately priced 4-speed Gramophone Unit which incorporates an automatic stop and can be fitted with any of the Studio Turnover Crystal Cartridges.

All enquiries to the Sole Australian Agents:

ELECTRONIC INDUSTRIES IMPORTS PTY. LTD.

139–143 Bouverie Street, Carlton • • • FJ 4161

SYDNEY	ADELAIDE	BRISBANE	PERTH
713 Parramatta Rd.,	90 Grote St.,	52 Bowen St.,	68 Railway Pde.,
Leichhardt, N.S.W.	Adelaide, S.A.	Brisbane, Qld.	West Perth, W.A.
Phone: LM 6327	Phone: LA 5295–6–7–8	Phone: B 6462	Phone: BA 9686, BA 8587

4422

MAGE ON CRT ERSISTS FOR DAYS

An ingenious development enables the trace originated by a cathode ray oscilloscope to remain visible for long periods, and to be erased at will.

ATHODE-RAY oscilloscopes are characterised by the disadvantage relatively short persistence. Evaluan of transient phenomena is diffit because of the short time that ves remain legible.

Toward the end of WW II, use was de of blue-writing oscilloscopes. But se fell into commercial insignificance the post-war years. German engineers t out old files and began production a blue-writing crt. It is to be incorated into the design of a blue-writ- oscilloscope marketed by Wandel Goltermann, of Reutlingen, Gerny.

The rectangular front screen of the e is backed by a mica screen coated its inner side with a layer of potasn chloride. The front surface of the a is covered with a transparent cur-conductive erase coating provided wh terminals for connection to a source power.

As the beam of electrons generated the electron gun wanders across the een, it will leave a violet-blue trace ause of the potassium chloride chang- colour under the influence of the trons. The trace will remain legible the screen for hours and days, it is med. It can be erased at will by pass- current through the transparent er deposited on the mica screen.

The recorder unit has a built-in defition amplifier (frequency from zero to 10 kc) to give deflection factors up to 3.3 x 1000 mv per cm. Sweep ies can be varied between 0.01 and 3 conds. The useful recording speed is le 1,280 feet per second in ten lines ced 5/16 inch apart.

The time required to erase the comple image screen is about 30 seconds; sible lines can be individually erased ot after the other so that continuous cordings can be made.

Image definition is said to be sharp ough to permit photographic records

TINY CAPACITOR

A CAPACITOR 73 per cent smaller and 69 per cent lighter than the rgest comparable unit has been proed by the Micmold Electronics Divi- of General Instrument Corporation. It appears to be a big stride in the search a way to make high-reliability comnents smaller — especially in missil; which use from 200 to 30,000 capacitors of various types.

The capacitor weighs one-half gram n is .37 inches long, .19 inches wide nd .11 inches thick. Capacitance range is rom 5 uuf through 240 uuf with tolerances from plus/minus 2 to plus/minus 20 per cent.

SAFETY GLASS FASTENS TO TV TUBE

Twenty-one inch picture tube ready for attachment of contoured twin panel (left); twin panel sealed to tube forming integrated one-piece assembly (centre); and (right) varied TV styling which is not restricted to a few different cabinets designed around a safety glass.

SINCE TV picture tubes are capable of throwing quite a bit of glass around if they implode, a safety glass must be placed in front of the tube. The price for safety is — a dust gathering surface on the TV tube face and the back of the safety glass; two additional reflecting surfaces to cut down brightness and definition; and very restricted cabinet styling, since the safety glass is mounted in the cabinet .

DIRECT CONNECTION

A twin panel safety glass which is attached directly to the tube and eleminates these three problems has been developed by Corning Glass Works, Corning, N.Y. It produces a tube that is clean-for-life, since dirt can never reach the picture tube.

The specially curved glass face panel is bonded to the panel skirt of a finished television tube. A transparent liquid with an index of refraction the same as glass, is sealed between both panels. The liquid between panels is non-toxic, noncontaminating and can withstand sudden temperature fluctuations from — 40 F to 160 F. It retains its clarity indefinitely. The twin-panel tube will withstand more than 30 G's without failure.

STYLIST DREAM

With the safety glass and television tube sealed into one unit, a dust-proof assembly results, which allows new freedom in the design of smaller more compact sets. In fact the flexibility of cabinet design is probably its most outstanding feature. What the television indusry needs most now is a way to sell more sets.

The panels can be easily attached by either the set or tube manufacturer.

More to Boiling Than Meets the Eye

(Continued on Page 19)

to the water which also assists in the washing process.

The act of stirring a boiling liquid increases the heat transfer ratio, but if the surface of the metal boiler has become bound with vapour no amount of stirring will increase the boiling rate. If the temperature of the heat source is reduced then the boiling rate will be increased as the liquid returns to the state of nuclear boiling.

We will now return to the experiment of Mr Shiro Nukiyama and his piece of platinum wire and the reason for its peculiar behaviour becomes clear.

When the temperature of the wire is gradually increased it will cause nuclear boiling of the water in contact with it and the heat is rapidly transferred from the wire to the water. As the temperature is further increased transition boiling and then film boiling sets in where the wire is insulated from the water by a film of vapour and the heat transfer is low.

The electric current however still passes into the wire but the heat cannot get away quickly enough. The wire finally melts although it is to all intents and purposes submerged in a liquid.

So we find that the science of boiling has assumed great importance and the experiments of Mr Nukiyama opened a wide field of investigation.

Automatic Selection of Broadcast Programmes

AMONG new developments revealed at recent convention of the American National Association of Broadcasters was an automatic television programming system capable of handling up to 20 events.

The system is built around a memory unit using binary relays and stepping switches to store information. Programming is initiated on punched tape. A pushbutton selector unit operating in conjunction with a time select switch does the rest. The new system will perform all switching operations now done manually—keying in projectors, slides, sound sources and special effects.

Automatic equipment to log frequencies, power outputs and antenna performance of broadcast stations is now in test that will make automatic logging possible.

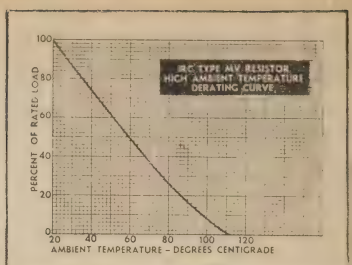
Another automatic development that attracted the convention's attention is an amplifier which automatically controls transmitted sound level, increasing or diminishing volume as actors change distance from studio microphones.

A long standing sore spot in the broadcaster's life, reradiation from towers near directional antennas, was probed early in the convention. A CBS engineer described a new development in coaxial chokes which has substantially reduced interference when properly positioned on the offending structure.

Station engineers listened with interest to a paper describing a transistorised colour television camera. The new device is 34in long and 41in high. It weighs 215lb. with its viewfinder. The reduced size is due chiefly to printed wiring, transistors and a redesigned optical system.

For HIGH VOLTAGE applications

where high resistance and power are required



IRC AUSTRALIA

TYPE MV HIGH VOLTAGE RESISTORS

IRC Type MV Resistors are designed for high voltage applications where high resistance and power are required. Unique application of IRC's famous filament resistance coating in helical turns on a ceramic tube provides a conducting path of long, effective length

Typical applications for which Type MV Resistors are particularly suited are voltmeter multipliers, high resistance standards, bleeders, grid leaks and voltage dividers. MV applications are also found in X-ray equipment, cathode ray tube circuits, off load capacitor discharge in high voltage circuits, photo electrical cell applications, high-range bridge circuits and other electronic circuits.

RATINGS indicated are maximum based on free air operation at 20°C. ambient **DERATING** curve is available on application. **TEMPERATURE COEFFICIENT:** —.005%°C. for low resistance to —.07%°C. for high resistance values. **HUMIDITY:** General protective coatings of special varnish baked individually at high temperature, provide protection against the effect of abnormal humidity

Contact your usual supplier for full details

Type	Power Rating	Peak Voltage Rating	Minimum Available Resistance at 20% Tolerance	Maximum Available Resistance at 20% Tolerance	Dimensions	
					Ceramic Length	Resistor Body Diameter
MVF	2 watts	5,000	2,500 ohms	250 megohms	1-3/4"	5/16"
MVG	4 watts	5,000	10,000 ohms	700 megohms	2"	9/16"
MVJ	5 watts	10,000	20,000 ohms	1,500 megohms	3"	9/16"
MVP	10 watts	15,000	50,000 ohms	2,000 megohms	4-1/2"	3/4"
MVA	20 watts	25,000	0.2 megohm	4,000 megohms	6-1/2"	1-1/8"
MVO	30 watts	50,000	0.4 megohm	8,000 megohms	10-1/2"	1-1/8"
MVR	40 watts	100,000	1.0 megohm	20,000 megohms	18-1/2"	2"

Available with Lug Terminals and range of Ferrules

Sole Australian Agents—

Wm. J. McLellan & Co. Pty. Ltd.

126 SUSSEX STREET, SYDNEY. BX1131

(50 yards north of King St.)

NEWS AND VIEWS OF THE MONTH

...oring electric power

...E first British combined pump-...turbine, a device which allows ...o-electric stations to "store" surplus ...r from off-peak periods, is being ...ned by the Department of Scientific ...Industrial Research, East Kilbride. ...r Scottish engineering company. ...e hydro station—an already suitably ...ed power station — uses successive ...r to pump water uphill into a ...voir. Then when additional power is ...d the water can be used to work ...tation's turbine.

...mps and turbine are used separ-...for this operation but the D.S.I.R. ...s Division are combining the pump ...urbine in their own design.

...tish power stations have an aver-...output of just under 50 per cent ...ity but the demand for supplies is ...n. Greater efficiency is obtained ...they operate at full load and this ...od of "storing" electricity on off-...periods will augment their poten-...say the company.

...ipped with a pump-turbine a ...o-electric station could release its ...l power in about five minutes ...as a normal power station would ...re at least half an hour to meet ...nds during the day.

...ur-human brain

...E U.S. Navy has demonstrated in ...Washington a mechanical brain with ...n characteristics.

...se characteristics include recognis-...ces, reading, translating, writing and ...ing.

The Navy claims that its "brain," which it calls "Perception," is the first non-biological system capable of receiving, recognising and identifying its surroundings without any human training or control.

The device demonstrated was an adaptation of an existing electronic brain.

The Navy will build within a year a pilot model.

Initial trials, using the U.S. Weather Bureau's computer at Suitland, Maryland, as a base, show that the machine can quickly learn to distinguish left from right with 97 per cent accuracy.

Like a human being the machine is supposed to grow wiser and more accurate as it grows older and gains experience.

Moon warning

AMERICAN scientists are warning Service missile chiefs not to "contaminate" the moon with "stunt" rockets.

The types of chemicals on the moon may reveal how life began on the earth, two prominent scientists said in the magazine "Science."

Dr Joshua Lederberg, geneticist, and Dr Dean Cowie, physicist, said any impact on the moon with rockets, accidental or incidental, may make later scientific measurements impossible.

The scientists are particularly opposed to "stunts" like hitting the moon with a nuclear bomb or splashing it with dye to make the impact visible from the earth.

They support the theory that the cosmic material drawn to the moon by its gravitational field has never been disturbed by atmospheric efforts or biological changes known on earth.

The age-old layer of dust on the moon should contain a record of the biochemical origins of life as informative as the earth's crust has been in the study of the earth's evolution, they say.

Note: This point was the subject of an Editorial in our July issue.—Editor.

About Big Ben

BIG BEN, the 13¾-ton bell whose hourly booming note has become the best-known voice in the Commonwealth, if not the world, celebrated a one-hundredth birthday on April 10.

It was on the evening of April 10, 1858, that the bell was cast in a Whitechapel foundry in East London, although its voice was not heard until 1859, when The Great Clock of the Palace of Westminster and the bell started their combined service. Big Ben will therefore celebrate another hundredth birthday next year.

Arthur Loverdige takes visiting parties up the clock-tower of the Houses of Parliament and he has made the climb up 336 stairs over 2,000 times. The secret of not tiring, he says, is to remember to make the upward journey on the flat of the foot, and when coming down to look straight ahead instead of down at the feet.

The figures on the four clock faces are 2ft in length and the 14½ft minute hands travel a distance equal to 100 miles a year around them. The faces, which were reglazed in the general overhaul of 1956, are lit by electricity. Previously they were gas-lit, and he and

POPULAR SCIENCE QUIZ

Q.: Are scientists making any progress in the controlling of insect pests, particularly the domestic varieties which are so unpleasant and dangerous?

A.: Yes, and the latest efforts are being directed against the cockroach, one of the most unpleasant domestic insect pests.

An American scientist has discovered that an inert, non-toxic dust, derived from silica can be 100 per cent successful in killing these pests. All died in less than 100 minutes and most in about 45 minutes.

The powder kills by absorbing an oily protective film that normally covers the entire body of the cockroach and prevents loss of water. Thus, the powder kills by desiccation and literally dries the insect to death. It is claimed to be the fastest and surest method of cockroach control yet devised. Not the least attractive feature is the fact that the insect does not need to eat any of the powder, but merely to come in contact with it.

Three different species of cockroach were used in the test, types that have been showing increasing resistance to common insecticides in recent years.

★ ★ ★

Q. Detergents are now widely used domestically. Surely large amounts must escape into sewerage systems where they may cause trouble?

A. The main trouble detergents can cause in sewerage systems is to inhibit the bacterial action upon which treatment of sewage depends. This is causing many difficulties in large systems. They also produce large amounts of foam which creates problems in creeks and rivers or for that matter at any outlet into water, where foam often builds up to very large proportions. The housewife is slow to realise that the action of a detergent is not dependent on foam, but because she has been used to the lather created by soaps, she expects the detergent to behave in the same way.

Experiments are being made on a world-wide basis to produce good non-foaming detergents which are also efficient, but when it comes to selling the product, consumer reactions, and also cost, are often the most important factors. Detergent makers are not primarily interested in the worries of sewerage experts who have to grapple with the end products. If housewives want a lather, it's fairly certain they will get it!

★ ★ ★

A recent quiz answer said that the moon appears larger on the horizon than when higher in the sky because of an optical illusion due to its proximity to other objects. A reader points out that there is considerable light refraction near the horizon and because of this the moon really has a larger apparent size. He could be right!

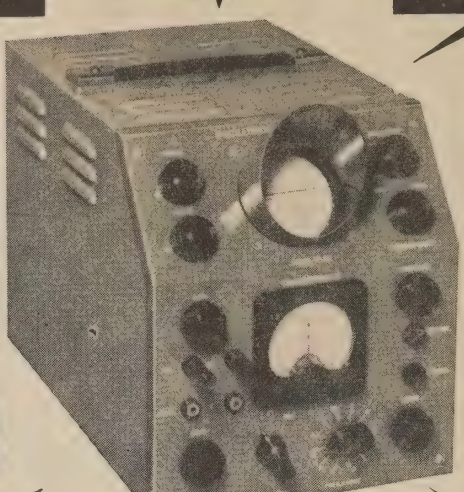
E·M·I MEASURING OSCILLOSCOPE TYP W.M

Industrial Research

Technical Colleges

Radio and Television Servicing

Production Testing



"Services" Workshop Testing

General Electronics

Dealer Servicing

A.C./D.C. Y. Amplification

Symmetrical Deflection

Visual Null Bridge Measurement

5 Range Voltmeter

Wide Range Time Base

The new E.M.I. Measuring Oscilloscope Type W.M.S. is a lightweight, general purpose D.C. coupled instrument of compact design. Incorporating exclusive features for rapid and easy measurement of voltage, it is recommended to Radio, Television and Radar technicians, to technical students and to science laboratory workers in all cases where an inexpensive instrument of wide application is required.

★ **MAX. SENSITIVITY.** 2"/Volt P-P or 0.5 volts/inch.
★ **ATTENUATOR.** X1-X2-X10. Fine Gain Control 10:1.
★ **REF. VOLTS FACILITY.** Phone jack lifts ref. level from earth to any desired value within ± 500 volts.
★ **FULL 1.3 mc/s BANDWIDTH** maintained at all gain settings (3 db down).
★ **VOLTAGE MEASUREMENT RANGES:**
5 — 0 — 5 50 — 0 — 50 500 — 0 — 500
10 — 0 — 10 100 — 0 — 100
2" scale centre zero meter.
★ **TIME BASE FREQ. RANGE:**
7.5 c/s to 90 kc/s in 12 ranges (3:1 fine freq. control).
★ **EXTERNAL TIME BASE** requires 56 volts P-P for F.S.D. (20V r.m.s.).
★ **POWER SUPPLY.** 110, 200, 210, 220, 230, 240, 250 volts; 50 C.P.S.; 90 watts A.C.
★ **WEIGHT:** 24 lbs.

★ INPUTS ATTENUATOR		INPUT R	INPUT C
A.C. or D.C.	X1	1 meg.	65 pF approx.
	X2	2 „	65 „ „
	X10	10 „	35 „ „

★ **DIMENSIONS:** Height, 9¼"; Width, 8¼"; Length, 13".
★ **CATHODE RAY TUBE:** 2½" diameter, type 3AFP4.

PRICE: £85/10/-, including Sales Tax

E.M.I. (AUSTRALIA) LIMITE

301 CASTLEREAGH STREET, SYDNEY — BA 2501

TR.32.F

colleagues used to go up with es and light the gas every evening out it out in the morning.

is an odd thought that balanced ne pendulum of the big clock are copper coins (9½d, to be exact) have been placed there to regulate ime. If the clock man were to re- a penny or add another it might a difference of one/fifth of a d in 12 hours.

e clock tower stands almost on the f the clock tower of the old Palace estminster, built in the reign of rd I (1272-1307) which was pulled in 1707 and was not replaced the present one was started in

ctor's success

MELBOURNE anaesthetist has de- veloped a new technique which is ted to receive world acceptance in surgery.

ne out of 10 operations using the echnique have been successful.

e process uses fluothane.

e Director of Anaesthesia at Mel- e's Alfred Hospital (Dr Robert H) began experimenting with fluo- about a year ago.

developed the process in partner- with a Collins Street specialist, who he drug now allowed him to do operations not previously possible

e new process supersedes hypother- a— where the patient is "frozen" for tion and is much faster.

s safer than the use of the "heart

ypothermia sometimes takes 12 hours he recovery rate is slow.

e new process allows a similar tion to be done in two and a half

Orton and his assistant did the ti experiments together in the Baker al Research Institute.

ped disrupts radio

AUTICAL engineers have re- orted an interesting problem involv Doppler" effect and radio signals.

o planes closing in on each other ach travelling at 2½ times the speed und cause a speed-up in their com- used voice communication bands. fter they had passed each other the ency was slowed down by the same ount.

s variation might move the signal a out of the band to which it was d.

ablishment of two or three satellites ,000 miles above the earth with instru- n for relaying short-wave signals. ul overcome this.

se satellites would have the same ee as the rotation of the earth, so ey would seem to be stationary in the y.

satellite relay system could carry unds of channels simultaneously and ie: the congestion of the present radio ectum.

e system also could make long- g or even world-wide television pos- le.

e main unsolved problems were a ost rocket that could get the moder- sized satellite to the 22,000-mile level. d means of furnishing the satellite th power to operate its relay equip- n.

ese problems may be solved in time e ablish such a system in from five 1 years.

HI-FI SALE

Once-a-year clearance at Ridiculous Prices to make way for new stock.

Peter Clark says: This is my once-a-year genuine Sale. Prices on all these lines are absurdly low. Unfortunately there's not enough for mail orders. Preference is given to Radio & Hobbies Readers.

CABINETS: Few shop-soiled Sherwood cabinets, complete with silk fronts from as low as **£22.**
SABA 4 speaker cabinets, to clear at **£19/10/.**
Davey Corner Horn, suitable 12in, originally sold at £55 now **£22/10/.**
RJ BOXES, unpolished, from **£5/10/.**

EQUIPMENT CABINETS: 2-door with gold trim, few only shop-soiled, from **£25** (these usually sell at £37/10/).

AMPLIFIERS: A few imported de-luxe amplifiers, demonstration models or slightly shop soiled, to clear **from £35.**

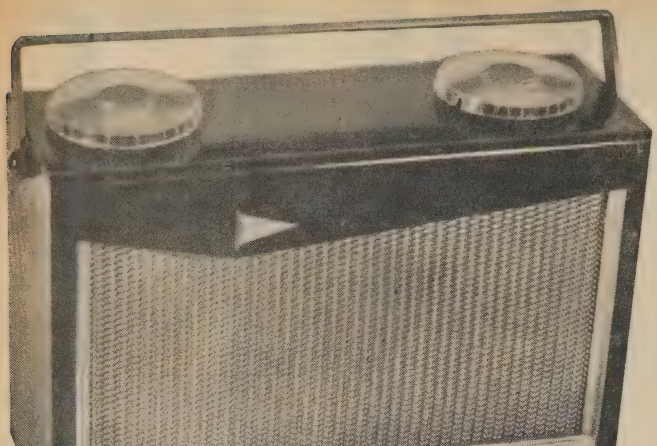
RECORD PLAYERS: Slightly shop soiled, from **£10.**
Goodmans 150 loudspeaker, shop soiled, **£19/10/. Goodmans Midax,** with horn, **£21/10/.**
Goodmans Axiette, shop soiled, to clear at **£12/15/.**

TAPE DECKS: Collaro tape decks, 3 speeds, shop soiled only. Usually £52/19/6, now only **£39/19/6. TRUVOX,** 2 only, usually £69/10/, now **£47/10/.**
BSR Record Cases, from **£2/10/.**

SORRY, NO MAIL ORDERS.

MAGNETIC SOUND INDUSTRIES

BISLEY HOUSE, 387 GEORGE ST. BX 4440, BX 4587



In its polished wood cabinet, our first full-scale transistor receiver looks as stylish as any commercial receiver. A leatherette cabinet of the same dimensions will also be available.

New!...The Transporta Transistor Mantel Set

In our file of readers' requests is a thick section devoted to letters requesting the descriptio of a full-scale transistor superhet portable receiver. Here is our answer to those requests A compact design, easy to build, capable of excellent performance, with unprecedente battery economy and for which all components are readily available locally.

Numerous circuits have appeared in overseas publications, some of which have been reprinted in our own magazine. Transistor portable receivers have been available on the ordinary retail market for some months.

The natural query in the minds of those hundreds of readers who would like to build a transistor receiver for themselves is: "Why haven't you done something before this about a description with full diagrams and component specifications?"

The answer is, very simply, one of supply.

While we have had sample quantities of suitable transistors for more than 18 months the total quantities available to home builders, after the requirements of defence and research organisations had been met, was not enough to meet even a small demand. We expect that transistor receivers will be built by the thousand.

Part of the reason for the shortage of transistors has been the policy of the import licensing authorities, who have permitted the importation of transistors only for high priority purposes, but it goes even deeper than that.

The special advantages of transistors in terms of battery economy and reliability have been quickly recognised all over the world, making them in short supply, even in countries where they are manufactured in huge quantities.

We are happy to say that the position has now eased to the point where we can go ahead with the description of a receiver and be certain that all components can be obtained.

by Maurice Findlay

The Alexandria factory of Stan Telephones and Cables Pty. Ltd. is producing audio transistors under different type numbers. Arrangem have been made with Texas In ments Inc., U.S.A., and covered appropriate import licensing, for supply of the RF transistor types quired in a complete receiver.

Having the assurance that the sistors would be available, local m facturers were only too happy to pro the other special items required, suc coils, transformers, dials and cabi We will go into more detail on this ject in the description of the construc of the set.

Many of the details of the rec design published here had their o in S.T.C.'s transistor applications lab tory. Naturally, as makers of transis they are anxious that their product used to best advantage and they expended a good deal of energy design to be distributed to rec manufacturers and people like ours who represent users of transistors.

Since here was a circuit which freely available and on which a deal of development work had carried out we could do no better use it as a starting point.

Using initial samples of coils audio transformers from local manu turers, we constructed a complete ceiver and began a series of checks its performance in our laboratory.

Among the many p checked in detail were power output, quality, sen ity, selectivity and behavio the automatic volume co system under conditions of strong and very weak sig At the same time S.T.C. ca out further checks and able to advise us of m modifications they thought sirable.

We have departed from circuit in one or two minor ma one of the reasons being that we that the cost of a few extra small ponents would not worry home bui

In the meantime, RCS Radio had interested in the project, and had a pair of printed wiring boards—on the RF section and one for the section. The differences between wiring required for our final circuit that provided by the RCS printed w are small. Readers who wish to c can save a great deal of time and by using the printed boards.

On the other hand, there are ments for making your own boards if you are not short of time and have in mind the possi of experimenting with other circu a later date. Impedances in tran circuits are quite low by valve stan and we see no reason why minor ch in layout would alter performanc preciably.

Conventional inverted dish for

e resonant frequency of the cir- can also be varied by varying the on of the coil on the ferrite rod, int which we use to advantage in ng the complete receiver.

e ratio of voltage to current devel- across the main coil is too high fficient use by the first transistor. best ratio is chosen by coupling il of few turns to the main coil naking use of the energy developed s this to feed the transistor.

is possible, and sometimes desir- to amplify the signal at the in- ng frequency. However, when it is d to keep the number of stages to a minimum, better results can btained by employing a frequency rter stage which changes the in- ng signal to an equivalent signal at ver frequency.

plification of the signal at the low- equency can be made greater than nal frequency and also the ability e associated tuned circuits to re- nwanted signals on adjacent fre- ies improved.

RT STAGE

T: 2N252 transistor in this receiver es as the frequency converter. Al- h the circuit details are different, me heterodyne process used in receivers is employed.

T: transistor is connected to oscil- e t a frequency 455 Kc higher than requency of the incoming signal. e oscillations and the incoming sig- re mixed, resulting in the genera- of at least two additional signals.

T: one which is of most interest to the difference between the fre- y of the local oscillator and the n. i.e. 455 Kc.

is possible to keep this difference nt by tuning the oscillator with ion of the tuning capacitor coupled e same shaft as the signal fre- y tuned circuit. Components are led so that exact adjustment of acking can be made in the align- n process.

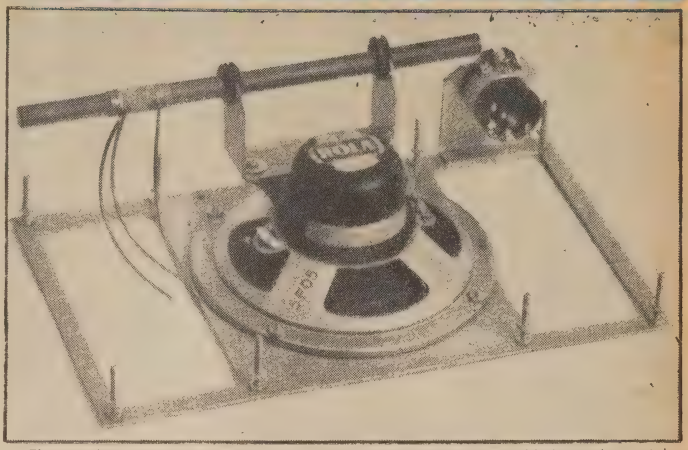
MPLIFIER

T: output signal from the 2N252 x transistor is fed to the first inter- te frequency transformer, IFT1, has two tuned windings coupled ier. It is designed to select a nar- band of frequencies close to 455 d reject the oscillator frequency, ignal frequency and the sum of s two.

ch of the ability of the complete ver to select the required station adjacent stations close in frequen- depends on the efficiency of this IF normer. In the alignment procedure, th of its windings are resonated at cy the required frequency by means pair of ferrite slugs.

T: secondary winding of the trans- r is tapped so that the intermediate ncy energy is passed on to the 3 IF amplifier transistor at the tium voltage to current ratio, or ance, as it is usually called.

er amplification the 455 Kc signal sed on, via IFT2, to GD4 ger- m diode detector. This second IF normer assists with the selectivity il providing the best impedance

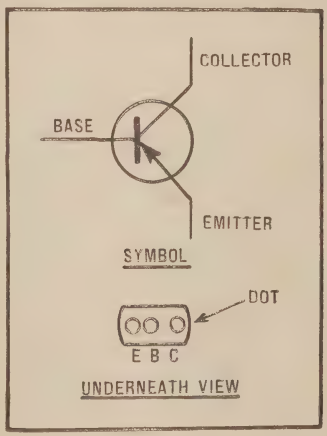


The speaker, aerial rod and volume control potentiometer assembled on the metal plate, which forms the basis of the mechanical assembly. The RF board mounts to the left and the audio board to the right. Place the audio board in position before mounting the pot.

match between the 2N308 and the GD4 circuits.

The detector circuit is an essential part of the receiver because it extracts the audio frequency modulation from the 455 Kc intermediate frequency signal. This audio frequency signal corresponds with the audio frequency signal from the microphone which was impressed on the carrier wave at the transmitter.

Although it is much stronger than when it arrived at the aerial, the audio signal is still not strong enough to operate a loudspeaker. An audio frequency amplifier using another four transistors is needed to amplify the audio frequency range between, say, about 50 cps and 8,000 cps, depending on the quality of the receiver.



This diagram shows you how to identify the connections to the transistors. The TS1 and TS2 are smaller and round, but the collector side is identified by the dot of paint.

It is interesting to note that the GD4 detector produces a steady direct current which depends on the strength of the incoming carrier. This current is applied to the 2N308 transistor in such a way that its amplification varies inversely as the station strength.

CONTROL OF VOLUME

The system is known as automatic volume control, or AVC, and has the effect of tending to keep all stations at the same volume.

A volume control in the GD4 circuit allows the desired proportion of the audio output to be selected and passed on to the TS1 and thence to the TS2 transistor for amplification.

The TS2 drives a pair of 2N185 transistors which operate as class-B power amplifiers. This type of amplifier has the advantage over alternatives of enabling relatively high audio outputs to be obtained from small transistors. It is very economical of current when amplifying a signal and requires practically no current during pauses between speech and music.

For these advantages it is necessary to have two transistors in a push-pull circuit and, although alternatives are possible, it is usually most convenient to include a driver transformer.

A second transformer is used to couple the loudspeaker to the output transistors, the turns ratio being chosen so that the load reflected to the 2N185's is best from the point of view of power output and distortion.

The small amount of distortion which remains can be greatly reduced by a circuit which takes some of the audio frequency energy from the speaker and feeds it back into the emitter circuit of the TS2 in opposition to the incoming signal.

This arrangement is known as negative feedback. It results in a loss in amplification but the gain can easily

"only as good as its components..."

Every experienced radio hobbyist knows that his set is only as good as th components he employs. In approving the Tecnico Electronics printe circuit board Radio Television and Hobbies has ensured for you the highes standard of performance for your Transporta Portable. Any technica queries which readers may have will be welcomed by our company whic maintains a close interest in radio engineering for the amateur and th professional engineer. Useful data sheets for Goldtop transistors ar freely available on application.

Sole Australian Distributors

tecnico ELECTRONICS PTY. LTD

53 CARRINGTON ROAD, MARRICKVILLE • PHONE LL 0411

ade up, as in this case, by stages ting at such a low level that dis- n is negligible.

ally, to complete the operation of eceiver, the loudspeaker performs fundamentally important job of orming the audio frequency elec- impulses into sound waves.

general, the larger the speaker the will be its sensitivity and the the quality of the audio output. uld have been possible to use a er smaller than the one finally 1 but since, on this occasion, we ot trying to make the smallest le receiver, there is everything to ined by using at least a 5in speak-

lier in the article, we mentioned ransistors are sensitive to heat and special stabilising circuits are in- f to enable them to operate at high ratures.

ITIONAL RESISTORS

stabilising circuits consist of a rk of resistors surrounding each sitor and account for resistors ap- g in the circuit in positions un- ar to constructors of valve re- s.

the case of the TS1, operating ions are such that a simplified arrangement is possible. This re- in the saving of two resistors and acitor which would have been re- l for the conventional bias system.

the other hand the bias require- of the 2N185 power transistors ore difficult to satisfy. Best results btained when a temperature sensi- lement is introduced into the cir- This element, the CZ9A Thermis- s also available from S.T.C. and ering its modest cost we feel that clusion is well worth while.

ders who are interested in transis- will wish to probe more deeply he details of the circuit than has possible in this short discussion.

RNATIVE DESIGNS

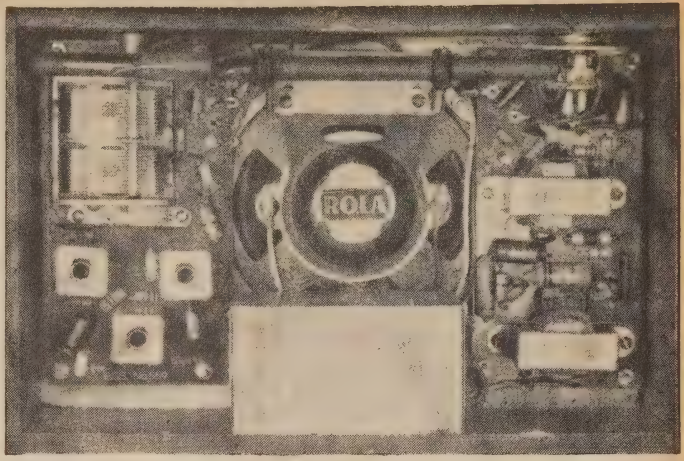
intend doing some further work esults will be published when we hat they have some real signifi- In the meantime, the present de- will give more than adequate re- around city areas. City listeners lso expect a selection of country is but obviously results will not a good as with a receiver employing F and possibly a second IF ampli- age.

audio power output and tone of eceiver both compare more than ably with the usual valve-type portable.

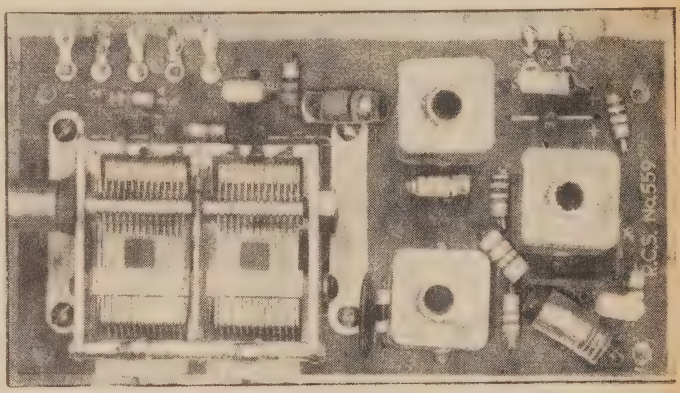
addition of an RF stage is large- il up with the supply of transistors moment, because not even the is really suitable for this posi- A second IF stage using a 2N308 be worth while. Care would need taken to avoid instability and VC system may need revision. In se there is the possibility of even effective AVC action with the pres- ngle IF stage and we have in to do some further work along lines.

gain of the audio amplifier could ireased by the substitution of high- n transistors for the types speci- A more elaborate bias network e desirable for the first transistor. ha high gain audio amplifier it is particularly necessary to select a potentiometer which has a low "hop on" resistance so that very low volumes can be selected when necessary. We understand that some of our advertisers have made arrangements for suitable items to be available, possibly by the time this article appears in print.

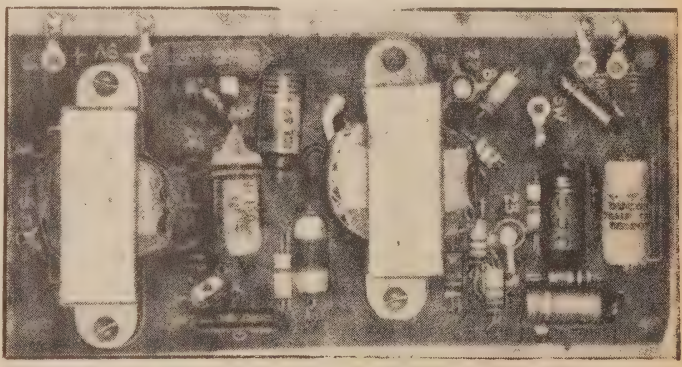
COMPLETE RECEIVER FROM THE REAR



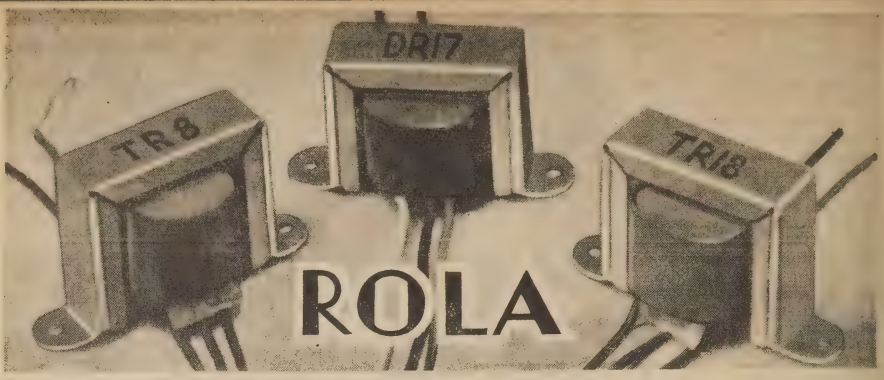
Rear photograph of the receiver in working trim. The battery is a standard 9 volt type intended for transistor receivers and mounts under the speaker.



This top photograph of the RF wiring board shows how it should look with all components in place.



The audio wiring board. Study this and the photograph above in conjunction with the detailed layout drawings on page 39.



TRANSISTOR TRANSFORMERS

Suitable for use in the "Radio, Television and Hobbies"

"TRANSPORTA"

These transformers have been designed in the Rola Laboratories specially to meet the requirements of Australian radio set manufacturers for highly efficient driver and output units which provide a good frequency response when used with standard type low-powered transistors.

They are intended to operate into a standard 3.5 ohm impedance loudspeaker voice coil. In addition to Types DR17 and TR18 which have been designed for the transistor portable described in this issue. Rola also makes other types of transistor transformers. Specifications of some of these are listed below.

ROLA TRANSISTOR TRANSFORMER SPECIFICATIONS

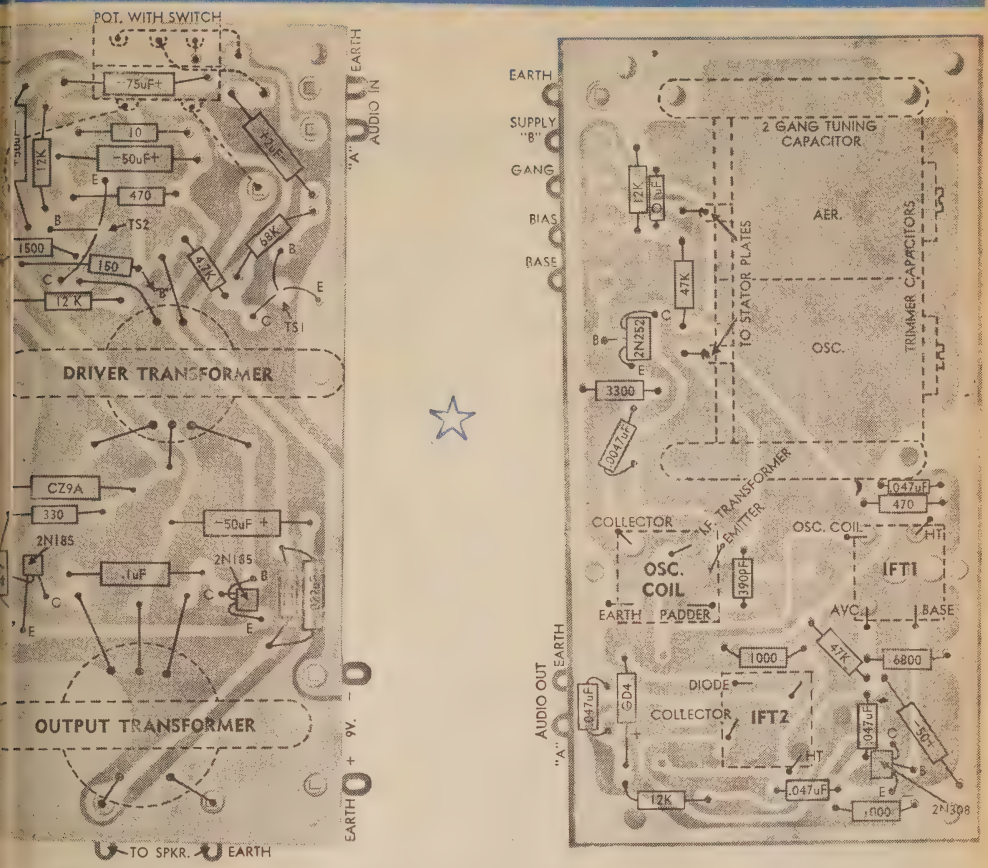
TYPE	DESCRIPTION	IMPEDANCE OHMS	OUTPUT POWER 6 v.	OUTPUT POWER 9 v.
DR17	Driver transformer	3,000 — 2,000 c.t.		
TR18	Output transformer	375 c.t. — 3.5	175 mW	300 mW
DR4	Driver transformer	3,000 — 1,300 c.t.	150 mW	250 mW
TR7	Output transformer	420 c.t. — 3.5		
TR8	Output transformer	300 c.t. — 3.5	200 mW	375 mW

HIGH EFFICIENCY LOUDSPEAKERS

Two small high-efficiency Rola loudspeakers have already been developed for use with transistor or conventional battery-operated receivers and amplifiers. Others are on the way. For this transistorised portable use a Rola Model 5F. For miniature transistor receivers we recommend the new Model 4C-05A fitted with an F44 diaphragm. This speaker measures only 4⅛" overall by 1¾" deep, is light in weight—only 6¾ oz. (without transformer), yet has an efficiency equal to that of the earlier Model 4F. Its low cost, small dimensions and light weight make it ideal for miniaturised battery or transistor receivers.

ROLA COMPANY (AUST.) PTY. LTD.

DIAGRAMS SHOW POSITIONS OF ALL SMALL PARTS



Both photographs are full size and show the printed wiring boards from the wiring side (underneath). The positions of all components above the boards are indicated so that you can complete the set, all but for a few interconnecting wires discussed in the text, from the above. The audio board is to the left and the RF board to the right.

The fact that printed wiring boards have been suggested makes it necessary to be specific about some of the components.

Component brands mentioned have been checked and will fit without any modification. One exception is the Jabel coils where the modifications are very minor and we have given the details in the separate drawing.

The receiver is constructed on a metal base 9½in by 5½in. This plate has two rectangular holes each 4¾in by 2in, one at each end and a central 4in diameter circular hole.

The wiring boards are mounted over the rectangular holes, while the speaker is mounted over the central round hole. A bracket holds the volume control potentiometer which is mounted in place on the audio wiring board is position-

FINAL MOUNTING

The speaker is supplied without a transformer and a U-shaped bracket to fix to the speaker bracket to hold the ferrite aerial rod.

A pair of 3/8in ID rubber grommets to fit the aerial rod secure it as a push fit in slots in the U-shaped bracket while the aerial coil slips over one end of the rod. Eight 1/8in diameter bolts 1in long are secured to the metal plate and support the wiring strips.

Relative positions of all components should be clearly visible in the photograph showing the assembly without the wiring boards.

WIRING BOARDS

A detailed description of the assembly of the wiring boards is warranted. It takes almost as long to describe in words as it takes to do the whole job.

Let us assume that you decide to start with the RF wiring board. The first job is to mount the major components, i.e., the 2-gang tuning capacitor, the oscillator coil and the two IF transformers.

The Roblan 2-gang is intended to mount so that its plates open upwards. The appropriate holes in the body of the capacitor may or may not be tapped to take 1/8in diameter screws. If not, the capacitor will be supplied with four No. 4 self-tapping screws 3/16in long.

Secure the mounting feet to the body of the capacitor with the self tappers or the 1/8in bolts as the case may be. If 1/8in bolts, make sure that they are not so long as to touch the plates. If too long, screw a nut down hard against the head, file to about 3/16in and remove the nut and, at the same time, the burr on the thread.

Examining the trimmer capacitors—which incidentally are 50pF types—you will note that one plate makes electrical contact with the adjusting screw. This side connects to the frame of the capacitor.

First, solder the opposite end of the trimmer to the brass lug connecting with the fixed plates. Then, bend the trimmer over and solder the earthy end to the bar which contacts with the moving plates of capacitor. This is the heaviest solder job in the set because the temperature of the bar has to be raised to the melting temperature of the solder.

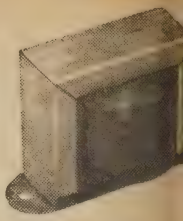
MOUNTING COILS

With trimmers, feet and extension shaft secured, the tuning capacitor can be bolted to the wiring board.

The RCS coils will probably be secured to the wiring board as you buy. A drawing shows exactly how the Jabel coils should be placed. Bend the lugs over so as to hold the shield cans of

FERGUSON

TRANSFORMERS



FOR THE

TRANSISTOR PORTABLE RECEIVER

DESCRIBED IN THIS ISSUE

DRIVER TRANSFORMER

TYPE TRD108

PRIMARY—3000 OHMS
SECONDARY—2000 OHMS C.T.

OUTPUT TRANSFORMER

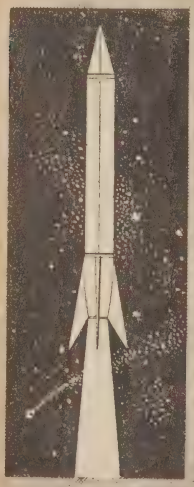
TYPE TRS109

PRIMARY—375 OHMS C.T.
SECONDARY—3.5 OHMS

AVAILABLE FROM ALL LEADING SUPPLIERS

Manufactured by

FERGUSON TRANSFORMERS PTY. LTD., CHATSWOOD, N.S.W



RAYNORS PTY. LIMITED.

THE JEWELLERS TO INDUSTRY

Are proud to announce their association with the transistor portable (described in this issue of Radio and Hobbies) by the supply of circuit boards.
"Raynor" printed circuit boards are used by Australian manufacturers adopting this modern technique. Raynors are the pioneers of printed circuit boards in Australia. "Raynor" boards are renowned for reliability and faithful reproduction.
Apart from their extensive commercial use, circuit boards are used in electronic sections of guided missiles, electronic brain machinery, radiosondes, shell fuses, etc.

Manufactured under world license by

RAYNORS PTY. LIMITED

102 Bonds Rd., Punchbowl, N.S.W.
Phone: LF9371 (10 lines)

ls firmly against the wiring board.
ement of the small wiring com-
s is very simple and should take
few minutes. All resistors and
ors with the exception of the 50
ctrolytic can be connected into
either way around without affect-
e performance.

all leads through the wiring
bend them over just enough to
he components in place and snip
onvenient length, say, no longer
/8in.

his point you can heat your sol-
iron and solder all components
o the IF transformer lugs to the
wiring. The wiring is firmly
to the insulating board and will
so even at a much higher tem-
e than is necessary to melt sol-
wever, there is no sense in over-
the job, including the compon-
nd we recommend that you use
ough heat to ensure a firm joint.

TO SOLDER

only resin core solder, preferably
p.c. tin and 40 p.c. lead type
melts at a low temperature.

xtra flux is required nor is any
e. The resin core of the solder
excellent non-corrosive flux and
ated wiring board is coated with
delivered.

ecting lugs on both strips will
y make contact with the printed
without any special provision, but
mmend that you place a spot
der on each just to make sure
re is a good electrical connection.
s from the two sets of stator

ISTOR COLOUR CODE

	Blue	grey	orange
	yellow	violet	orange
	brown	red	orange
	blue	grey	red
	yellow	violet	red
	orange	orange	red
	brown	green	red
	brown	black	red
	yellow	violet	brown
	orange	orange	brown
	brown	green	brown
	brown	black	black

of the tuning capacitor connect,
appropriate holes, with the
e wiring below the board.

sistor mounting is worthy of
iscussion. Commercial sets often
e transistors mounted with short
nd the body of the transistors
the wiring board. However, we
t there is a lot to be said for
the leads full length. Provided
mplete the soldering job reason-
uickly, no special heat sink is
ry. Cover the leads with spag-
bing.

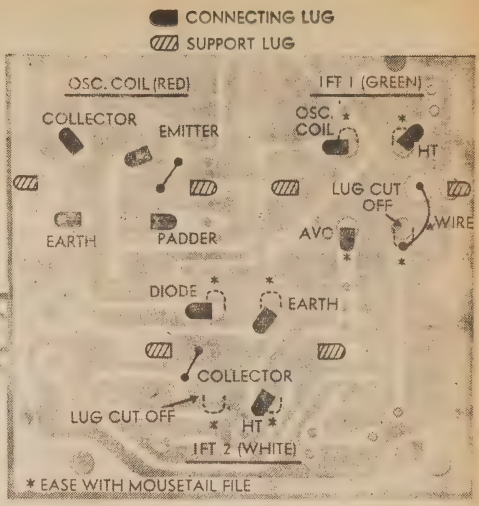
areful in selecting the transistor
or connection to the wiring board
o the polarity of the germanium
Not only could a wrong con-
io result in the set not operating
components could easily be damag-

mar remarks apply to the wiring
audio board. You will probably
y mounting the transformers,

☆

The Jabel coils require a slight modification to the wiring boards in order to fit perfectly. Full information is given by this photograph which also shows exactly how the lugs from the coils connect with the printed wiring.

☆



follow with resistors and capacitors and finally install the transistors.

There are five electrolytic capacitors which have to be installed in the correct polarity. The thermistor can be installed either way.

After double checking that all solder joints are in order, the two wiring boards should be installed on the baseplate with the aid of the long 1/8in diameter bolts and positioned so that they just clear the speaker.

With the switch potentiometer in place, five short lengths of hook-up wire are used to connect it to the audio wiring board. The drawing gives full details but note that you are looking at the wiring from the opposite side.

Some switch potentiometers have a double-pole switch and if you don't have a meter, some trial and error may be necessary in order to select the correct lugs. If you are not sure, you could even try joining the switch leads together just to get the set working.

INTERCONNECTION

A few more lengths of hook-up wire are needed to interconnect the two wiring boards and the speaker. The speaker lugs should connect with the appropriate lugs on the audio wiring board. The polarity and exact length of the wires are not important.

A pair of wires should be run from the 9V battery lugs on the audio board to the battery plug. Leave the leads about 18in long for convenience in checking the set before it is finally installed in its cabinet.

Double check the polarity of the battery leads as a mistake here could easily ruin the transistors.

The earth lugs between the two wiring boards should be connected also, the terminals marked "A" and the points marked "B". Note that the point "B" on the audio board does not have a separate lug but is actually a point on the printed wiring.

IDENTIFYING CONNECTIONS

On examining the aerial coil you will note that it consists of a coil about 5/8in long overwound with a coil of a few turns at one end. The end of the longer coil, which is on its own, connects to the lug marked "gang". The other end of this coil joins with the adjacent end of the small coil and connects to the lug marked "bias" while the remaining end of the short coil goes to "base". None of these leads need be longer then 3½in at the most.

Place the ferrite aerial rod through the aerial coil, place the rubber grommets on the rod and push the rod into position on its mounting bracket. One

MU1033 PHONE **COLLINS RADIO** PHONE MU1033

NOW AT 71 HARDWARE ST., MELBOURNE, C1.

FAST QUOTE SERVICE

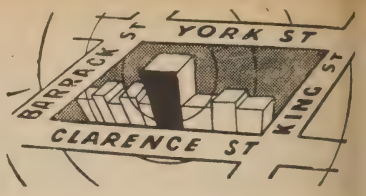
For quickest possible service, write on the left-hand side of a sheet of paper the radio parts that interest you—one beneath the other. If a kit, itemise. Add your name and address and send it to us with a stamped, self-addressed envelope. We will add the latest prices and return to you. Use this sheet as your order form and return to us with remittance for cost and postage as quoted. Goods will be sent same day. Any surplus refunded. Sorry, no C.O.D.

- 100 YARDS FROM OUR OLD ADDRESS OF 20 YEARS (409 LONSDALE ST.)
- SAME PHONE NO. MU1033.
- LOCATION HALF-WAY BETWEEN LONSDALE AND LITTLE BOURKE STS.
- HARDWARE ST. IS MIDWAY BETWEEN ELIZABETH AND QUEEN.
- WE SPECIALISE IN PARTS FOR THE RADIO EXPERIMENTER.

FASTEST, CHEAPEST MAIL ORDER SERVICE

GENERAL ACCESSORIES

PTY. LTD.
(FORMERLY HOMECRAFTS PTY. LTD.)
100 Clarence Street, Sydney
Phone BX 4451



RECORD PLAYING

Collaro 3/554 Record Players. 3-speed studio. "O" Cartridge, **£12/15/6**

Collaro R.C. 456 Record Changers, 4-speed studio "O" Cartridge, **£22/7/6**

B.S.R. HF8 Player **£13/5/-**

B.S.R. UA8 Record Changers, 4 speed **£20/10/**

Collaro 4-speed Hi-Fi Transcription Turntable £31/2/6

ROLA LOUDSPEAKERS

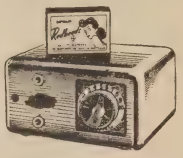
3C ..	£1/12/0	6-9L .	£3/9/-
4C ..	£1/11/6	8H ..	£2/10/0
4F ..	£2/1/0	8K ..	£2/12/6
4-5C .	£1/17/6	8M ..	£3/3/0
4-5F .	£2/8/0	8-PA .	£3/3/0
5C ..	£1/13/6	12K .	£3/6/0
5CX .	£1/18/0	12M .	£4/1/0
5F ..	£2/2/6	12-0 .	£6/0/0
5FX .	£2/5/6	12-0 De Luxe	
5-7H.	£2/8/0		£6/10/0
5-7L .	£3/3/6	12-0X	£11/4/0
6H ..	£2/5/0	12UX Hi-Fi, 15 ohm V.C.,	
6M ..	£2/18/6		£28/19/6
6-9H .	£2/15/0		

MANUALS

Radio Servicing No. 1	7/6
Radio Servicing No. 2	7/6
Radio Servicing No. 3	7/6
Fault Finding	7/6
Television Servicing	7/6
Magnetic Recording, Wire and Tape	7/6
Transistor and Crystal Diodes,	7/6
The Oscilloscope Book	7/6

PHILIPS VALVE DATA BOOK NEW ISSUE
18/6 plus 2/1 postage.

Q-PLUS CRYSTAL SET



Q Plus Crystal Set complete with Headphones and Aerial . **£4/19/6**
Q Plus Crystal Set only .. **£2/13/6**

CRYSTAL SET BUILDERS

Single Gang Condensers ..	1 guinea
Q Plus Headphones	£2/1/-
Spring Terminals	1/2 ea.
Germanium Diodes	
OA70—OA73	6/1 ea.
OA81-OA85	7/1 ea.
Jabel Crystal Coil	8/6 ea.
Aerial Wire (100ft)	14/9 ea.
Insulators	1/- ea.
Boys Book of Crystal Sets.	5/- ea.

SCOPE

SOLDERING IRONS 6 sec.

Standard	£2/10/-
Instrument	£2/10/-
Vibroscope	£1/15/-
Transformers	£2/10/6

Screw type hole cutters

Complete with wrench

7/8" 7 pin	£1/9/-
3/4" 9 pin	£1/15/-
1 1/8" Octal	£2/18/-
16-drawer steel Cabinets	£2/8/6

JUST LANDED

Calrad K300 Portable Transistor Kit Set.
Pocket Size, Complete with printed circuit
Leather Carrying Case
Full wiring diagram.
6 Transistors.
Speaker also Hearing Aid Extension.
£20 plus 25% Sales Tax

Rola Transistor Transformers

TR7 **18/- ea.**
TR8 **18/- ea.**
DR4 **18/- ea.**

Q-PLUS 17" TV Kit Set

Complete with wiring instructions, all components, picture tube less cabinet.
£120 including Sales Tax

COSSOR V.T.V.M. KIT SETS

£29 plus 12½% Sales Tax
Complete with instructio books, diagrams and printe circuit

GENERAL ACCESSORIES PTY. LTD. FAST DESPATCH SERVICE

f the rod should be adjacent to
id of the RF wiring board leaving
1¼in from the audio end of the
ate.
not attempt to secure the rod in
by wrapping a length of wire
d it.
ept for alignment, the set should
ready to go. If you connect the
y and switch on, the chances are
ou will hear some sort of a signal.
rou are in a location where you
expect to hear signals and noth-
appens, a complete check of all
tions is indicated.
ose a weak but steady station for
ence and start with the slugs in
transformers. There are two in
st IF transformer and one in the
i. With the set tuned as accurately
station as possible, turn the slugs
eatest volume. It should only be
ary to turn each slug two or three

L FOR ALIGMENT

nylon alignment tool is best for
ing the slugs as a metal screw-
may affect the setting. If the
driver slots you may be able to
acture a suitable alignment tool
a piece of plastic tube or even
d toothbrush handle.
tain IF transformers will have
with a hexagonal hole and the
alignment tool is really the best
r. They are obtainable from radio
suppliers for a few shillings.
the remainder of the alignment,
libirated knob should be attached
extension shaft on the tuning
tor and a temporary pointer, made
say a piece of wire, attached to
binet. Position the knob so that
w frequency end of the calibrated
is opposite the pointer with the
tor plates fully in mesh.
ne in a station at the low frequency
f the dial and adjust the oscillator
until this station corresponds with
rking on the dial.
Nw, tune to the high frequency end
e band and adjust the oscillator
er until a particular station ap-
at its correct position. Adjust
rial trimmer for greatest volume.
Rune to the low frequency end of
and and find the position of the
coil on the ferrite rod which
greatest volume.

NL CHECK

It is a good idea, then, to repeat
hole operation to make sure that
re getting the last ounce of per-
nce out of the set and that the
ations are as accurate as possible.
When you are certain of the position
e aerial coil, it can be secured
sition with a length of pressure
sive tape.
We think that you will feel, with
at transistor portables really have
mthing." The chances are that your
ill give many years of trouble
ervice with only occasional bat-
y eplacement. Good building.

SELECTED COMPONENTS for the "TRANSPORTA"

by JABEL

CALIBRATED KNOB
A new product in the modern style. 2½in diameter clear plastic, milled edge, gold backed. — TYPE SM Sydney and Melbourne stations. TYPE K Kilocycles for ¼in shaft—Roblan law.

VOLUME CONTROL KNOB—1¼in diameter to match.

COILS AND IFT KIT.
Comprising 8-inch ferrite rod aerial coil.
Double tuned first IF.
Single tuned single IF.
Oscillator coil.

TRIMMERS
Special Junior trimmers of 50 pf capacity. Red spot identification.

CABINETS
Timber cabinets — Polished Rosewood finish with anodised gold trim.
General utility model in leatherette also available.

by ROBLAN

Dial and coils were designed specially for the popular direct drive, Roblan RMG2 10/415 gang.
Also produced in 300 pf capacity.
One-inch extension shafts available.

by BRAMCO

Miniature transformers for the transistor portable.
TYPE TD 3/2 3000 to 2000 CT class B DRIVER.
TYPE TS 375 CLASS B PUSH PULL OUTPUT.

by MORGANITE

A 10K Switch potentiometer.
5 per cent log with low "hop on" resistance specially developed for this project.
All components listed above are suitable for use with RCS printed circuit panel.
559 — RF Section.
558 — Audio amplifier.

from
RADIO SUPPLY HOUSES EVERYWHERE

inserted by factory reps.

WATKIN WYNNE PTY. LIMITED
CROW'S NEST

BESIDES SUPERLATIVE PERFORMANCE AND MODERATE PRICE

M.B.H. PICK-UPS

ALSO HAVE THE LOWEST RUNNING COSTS

CHECK THESE POINTS

CHEAP STYLI:—Did you know that M.B.H. sapphire styli retail for only 7/5 each? They are easily the cheapest on the market.

RECORD WEAR:—M.B.H. pick-ups track at 4 grammes on L.P. records and 7 grammes on 78. At these feather-weight pressures your expensive records will last almost indefinitely.

REPAIRS:—If you damage your M.B.H. pick-up High Fidelity Products has an efficient repair service. By contrast few imported pick-ups can be repaired in Australia.

DURABILITY:—M.B.H. pick-ups have a long life. Many have been in daily use in broadcasting stations and recording studios for as long as seven years. Most of these are still using the original heads.

FAIR POLICY:—When improved model heads or arms are brought out it is not our policy to render your old one obsolete. The latest "D" type and "Stereo" heads fit any M.B.H. arm less than six years old and vice versa.

NEW SERVICE:—Your M.B.H. "C" type head can be modified to give the improved sound of the "D" type if its serial No. is higher than 1,500. Usual cost approximately 33/-.

Enquire at all leading wholesalers in N.S.W. and Queensland; William Willis & Co. Pty. Ltd., Melbourne: Atkins (W.A.) Ltd., Perth and Fremantle; Homecrafts Ltd., Hobart and Launceston.

HIGH FIDELITY PRODUCTS, 19 MARLBOROUGH RD., HOMEBUSH WEST, N.S.W.

HERE'S PLEASURE'S TAPE MEASURE

★ ELCON RadioCorder

The ELCON Radio Corder (radio and tape recorder combination) the greatest recorder bargain ever, featuring dual track record two-speed operation, up to two hours playing or record time as well as a six-valve, built-in radio.

ELCON IS USED EVERYWHERE . . .

● IN INDUSTRY ● IN COMMERCE ● CLUBS and SOC
● AT THE OFFICE ● FOR THE BLIND ● IN THE H
● FOR EDUCATION ● FOR THE MUSICIAN

Distributors: VIC.: Vealls Electrical and Radio Pty. 490 Elizabeth St., Melbourne, C.1. FJ 0456. Admi Distributors, 75 Bridge Rd., Richmond. JA 3416. N.S James Balfour & Co. Pty. Ltd., 13 Market St., Syd BX 5861. S. AUST.: James Balfour & Co. Pty. Ltd., Morphett St., Adelaide. LA 2444. QLD.: James Ba & Co. Pty. Ltd., 118 Stanley St., Brisbane. J7 W. AUST.: James Balfour & Co. Pty. Ltd., 297 Wellin St., Perth. BA 2144. TAS.: Admiralty Distributors, Bridge Rd., Richmond, E.1, Vic.

£155/10/- WITH RADIO

£124 STANDARD

Attractive colour scheme; two-tone green exterior with grey top.

OPTIONAL ACCESSORIES FOR EXTRA ADAPTABILITY

EXTENSION SPEAKER FOR QUALITY SOUND REPRODUCTION | FOOT SWITCH FOR OFFICE DICTATION PURPOSES | HEADPHONES FOR USE BY TYPISTS STENOGRAPHERS ETC | SUITABLE FOR USE WITH MANY TYPES OF MICROPHONES

Available at all good music and radio stores, or ask the distributors in your state to send further information.

CUT OUT AND MAIL TODAY!

Please send me particulars of the New Elc Radio Corder and Standard Tape Recorder.

NAME .....

ADDRESS .....

.....

Here's your answer, Tom!

Once again, Tom has put pen to paper in an effort to satisfy his craving for knowledge. Although one or two of the questions may cause the advanced experimenter to smile at their naivete, we felt that they are typical of the problems likely to trouble a beginner. Hence their inclusion in our selection for this month.

Why do signals from distant ansmitters tend to fade?

ading is a very general term, Tom, ch can describe a number of different nditions. The one you are probably t concerned with is fading from dis- broadcast transmitters.

his happens because the signals from a transmitter, are likely to reach r aerial by at least two paths—the und wave along the surface of the th and the sky wave, reflected from h ionosphere.

nce the paths travelled by the two ves are of different length, the waves will arrive at the aerial in quite random hase relationship. When they happen to be in phase, they add and build up sig- strength; when they are out of hase, they cancel and reduce signal ength.

irtual absence of the sky wave dur- the day accounts for the much weak- r signals from distant stations, like- for the absence of fading.

n the short-wave bands, reception almost entirely by ionospheric effects n fading can be due to the unstable ture of the ionosphere itself. One ght visualise the signals as being re- ted back to earth by a kind of "rub- ber mirror" which, as it varies and bends, ects varying amounts of signal to the eal.

lso, Tom, the signals may reach the eal by devious reflective paths, allow- n once again, addition and can- ation in terms of phase.

★ ★ ★

Why do AC sets have to warm p, whereas battery sets function mediately. Is this due to the ower transformer? If so, why?

he warming up period in an AC set s not due to the power transformer, ich operates instantaneously on tching on. Rather it is caused by the e required for the cathodes of the ves to reach operating temperature.

he cathodes of AC operated valves sist of a filament, called the "heater," r a tube surrounding the heater call- the "cathode," coated with an emit- e material. To bring the cathode to h correct temperature, by this indirect thod, it is necessary to pass a com- atively heavy current through the ater. A certain length of time must lapse before the correct temperature is tained.

he cathodes of battery valves, on the ther hand, consist of a very fine wire ated with a special material and re- ring very little current for electron ission. The warm-up period of these ilments is naturally very short, the ilments attaining the correct tem- erature almost instantaneously.

Fine filaments, as for battery valves, are not suitable for direct AC operation, since their temperature varies with the alternating current, producing a hum in the output.

★ ★ ★

How is a mains set converted to a battery set? Is it simply by supplying the appropriate voltages to the various parts of the circuit from batteries? Are there any difficulties involved.

It is impractical to convert a mains receiver into a battery operated one. The difficulty lies not only in supplying the correct operating voltages as being able to meet the current drain requirements.

AC valves have a comparatively high current consumption both in the heater and high tension circuits. Taking an average mantel receiver as an example, the heater circuits will draw approximately 2 amps while the high tension current drain will be in the order of 60 mA.

No battery, short of an accumulator, will supply the heavy current required by the valve heaters, while even the heaviest of B-batteries would run down quickly, if asked to meet the requirements of the high tension supply.

★ ★ ★

A piece of wood is useless as an earth. A metal chassis usually suffices, but a rod driven into moist ground is best of all. What is it, then, that determines whether a body will act as an earth or not?

An earth, Tom, may be described as a circuit point the potential of which cannot readily be changed. This point is usually at zero potential and a number of circuits may be joined to it so that they will have the same potential. From the foregoing it is obvious that an earth or any connection to it must be conductive, hence the uselessness of the piece of wood, which is an insulator.

A metal chassis may or may not be connected to an earth system or ground but is often referred to as being at earth potential, particularly in radio parlance. Thus a statement that certain wires, components or shields must be earthed, would normally indicate that they had to be connected initially to the metal chassis.

A chassis is frequently referred to as earthed because it is assumed that the chassis is connected to a conductor which eventually finds its way to an earth system, whether it is a metal rod driven into moist ground or the nearest water pipe. Alternatively it may be held at near earth potential by direct capacitance to earth or via the power mains wiring.

It is assumed that the potential of the earth cannot be raised by any electrical system devised by man, hence the use of the ground as a point of zero potential and the termination to it of circuits which are intended to assume that potential.

★ ★ ★

Why can't a filament valve be used in the place of an indirectly heated valve. As far as I can see the purpose of both cathodes is the same, that is, to emit electrons?

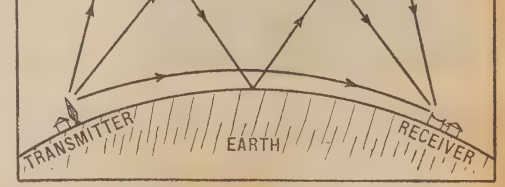
As you say, Tom, the purpose of both cathodes is the same, but there ends the resemblance. The battery valve filament is intended to operate on DC whilst the indirectly heated valve cathode may have AC applied to it.

Should you apply AC to the filament of a battery valve, portions of it will become alternately negative and posi-

☆

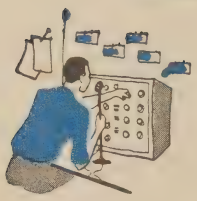
This diagram illustrates the rays which combine to form the wave arriving at the receiving aerial. The phase relationship of the rays depends on the path distance which is continually varying, as a result the received signal varies in amplitude.

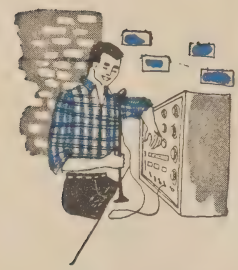
☆



AWV

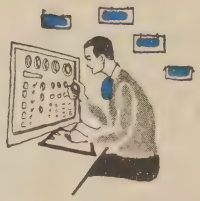
Calling All Hams..

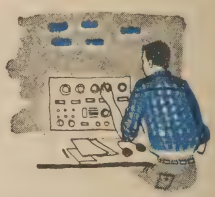


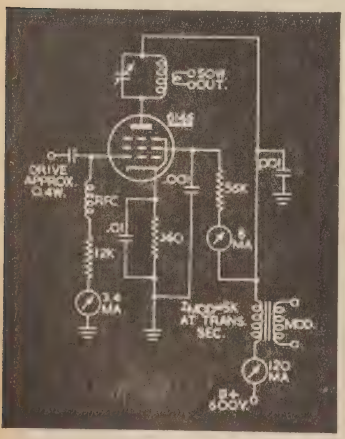


Because of its small sturdy construction, h
efficiency and high power sensitivity, the Ra
tron 6146 VHF Beam Power Valve is id
for use in both mobile and fixed equipm
Similarly, its suitability for both class licen
makes it the perfect valve for use in tr
mitters and audio amplifiers.

50 W. PLATE-MODULATED
CLASS C POWER AMPLIFIER







TYPICAL OPERATING CONDITION

Intermittent Commercial and Amateur Servic

A-F Power Amplifier and Modulator, Class A

Values are for two valves

Plate: ..... 750 V. at 240 mA (Max. sig
Screen: .... 165 V. at 20 mA (Max. sig
Power Output: 130 W. at 10% total distor
Drive: 0.4 W., 108 V. Peak A-F grid to

Plate-modulated R-F Power Amplifier, Clas

Plate: ..... 600 V. at 112 mA.
Screen: .... 150 V. at 8 mA.
Power Output: 52 W.
Drive: 0.4 W., 107 V. Peak R-F grid Volt

AMALGAMATED WIRELESS VALVE CO. PTY. LTD. 47 YORK ST., SYDN

50 times a second, with respect
th. This will be equivalent to ap-
a similar alternating potential to
id of the valve. A much enlarged
n of this alternating potential will
in the plate circuit of the valve
very other valve in the set.
et result will be a prominent
le hum issuing from the speaker.
ndirectly heated valves, the above
not happen. The heater or fila-
has no connection to the cathode
orms a separate circuit. Its pur-
is to provide the heat necessary
g the surrounding cathode to cor-
perating temperature. Hence it is
ssible to inject a 50 cycle signal
he cathode or grid circuits.
re is also the matter of tempera-
arying at mains frequency, men-
earlier, Tom.

★ ★ ★

**ow does an AC electrolytic
acitor work?**

AC electrolytic capacitor is of
on-polarised or asymmetric type.
it consists of two aluminium elec-
immersed in a conducting elec-
. Both electrodes are provided
microscopically thin film of ox-
hich acts as the dielectric. The
tance of the electrolytic is deter-
largely by the thickness of this

of the films is fully effective
while it is subjected to a particu-
tential, as on a particular half
During the alternative half cycles
electric property of the film is re-
to a very small value and the
which it is formed serves only
ribute the current into the elec-
by normal conduction.
arrangement of this capacitor
e considered as equivalent of a
connection of two polarised capa-
units. With such analogy it is
o see that two units become al-
ly effective and substantially in-
e as the polarity is reversed.
an AC circuit this type of capa-
r discharges and recharges only one
he electricity it can store accord-
its capacitance.
hermore the electrolyte has a re-
high electrical resistance which
s losses in the capacitor. Con-
tly these capacitors are intended
termittent operation only. If sub-
to a continuous AC voltage, the
tor will soon become heated due
se losses.
essive heating will evaporate the
lyte which will raise the internal
nce of the capacitor, and so on
he capacitor is destroyed.
most obvious use is as the capa-
in a capacitor-start motor where
rittent operation is ensured by
of a centrifugal switch which
atically disconnects the capacitor
e starting winding when a cer-
eed is attained.

★ ★ ★

hat are standing waves?

ding waves are a non-uniformity
distribution of current and volt-
a conductor, or in the distri-
of electromagnetic fields or in
stribution of sound intensity.
non-uniformity occurs when a
ed wave, travelling in the opposite
on, is superimposed on the for-
travelling wave. This condition is
terised by the presence of nodes
ntinodes.

Since the forward travelling components undergo progressive phase rotation as they travel from the source, and the reflected backward-travelling components do likewise as they travel back toward the source, it follows that the phase difference between the two components will show cyclic variations along the line of travel.

At those points, where there is zero phase difference between the two components, the value will be maximum. At those points where there is a phase difference of 180 degrees their value will be minimum. The points of alternate maximum and minimum values are referred to as antinodes and nodes respectively.

★ ★ ★

I would like to know a little about printed circuits. Could you please tell me what they are printed on and what the ink is composed of? Where could I obtain some for experiment?

Printed circuits are not printed in the sense of the word, Tom. The printing process is in fact a photo etching process. A fine layer of copper is deposited on bakelite-type board, after which unwanted copper is etched away to leave the required pattern, representing the wiring.

Components are then wired across circuit points in the usual manner by means of their pigtails which are pushed through holes in the board and the printed wiring and soldered into place.

A second method includes many of the components in the automatic processes. Components such as resistors are formed by depositing a layer of carbon between appropriate points, sprayed over later for physical protection.

The first method is the one most used at present and printed wiring boards should be available almost immediately to the home-builder.

★ ★ ★

What is the circuit difference between the AC volts and the output volts ranges of a multimeter?

The vital point to remember in this connection, Tom, is that the AC voltage ranges of a multimeter will also register any DC which is present in a circuit. (A slightly lower reading will result due to the extra resistance introduced by the rectifier.)

If it is desired to read the AC content of a circuit carrying both AC and DC, such as at the plate of a valve, an erroneous reading will result if the straight AC range of your multimeter is used.

The problem may be overcome by introducing a blocking capacitor in series with the multipliers, to exclude the DC component. Just such an arrangement is provided in the O/P ranges of your multimeter. A switch is used to introduce the series capacitor, which remains for all the O/P ranges.

★ ★ ★

What is a heterodyne wavemeter?

A heterodyne wavemeter is a stable, accurately calibrated radio-frequency oscillator used for frequency measurements. It may be made to beat with another oscillator or signal, the frequency of which is to be measured.

The meter is adjusted for zero beat with the unknown oscillation and the calibration reading then indicates the frequency of the oscillation being investigated.

DRILL KIT BARGAINS

from

10/-

weekly

Complete with:—

- *KBC or Sher ¼in electric Drill.*
- *Solid steel carrying case.*
- *Rotary Saw, if required.*
- *Grinding, polishing and sanding accessories.*
- *FULL GUARANTEE.*

TRADE ENQUIRIES INVITED

KBC "Craftsman" 5/16in Drill. 19 gns. or 10/- weekly

SHER ¼in Dual Speed Drill. £29/15/- or 15/- weekly.

GMF 6in Junior Bench Grinder. £24/14/6 or 12/6 weekly.

KBC and SHER ¼in Drills. from 5/- weekly.

YOU ARE INVITED TO CALL & INSPECT OUR RANGE OF POWER TOOLS. FOR YOUR CONVENIENCE WE ARE OPEN SATURDAY MORNINGS.

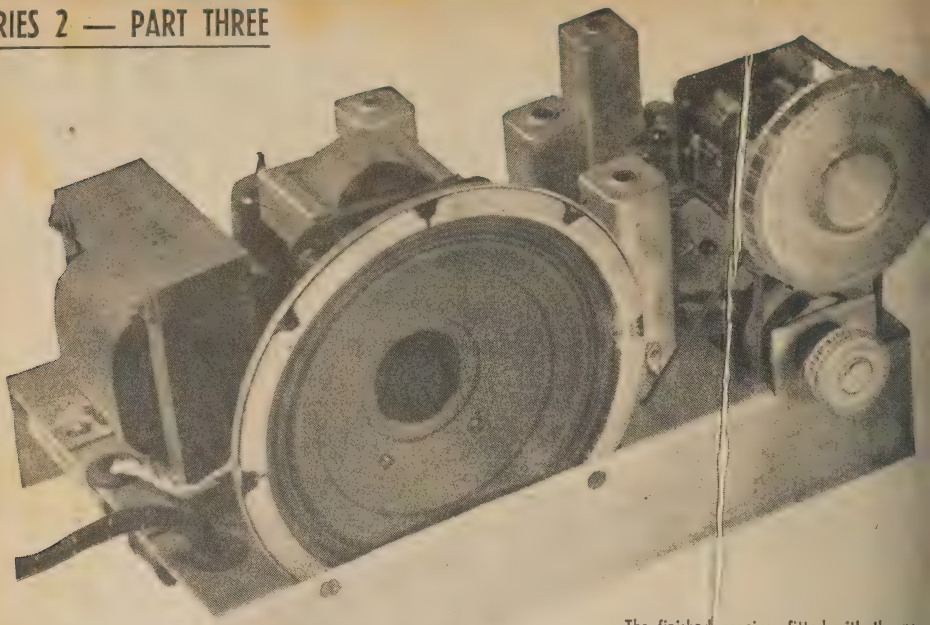
PHONE FY4055

JOHN LAWRENCE AND CO.

321 WILLIAM STREET, MELBOURNE

(Opp. Victoria Market)

SERIES 2 — PART THREE



The finished receiver fitted with the new and volume control knobs. The dial was roughly calibrated when this picture was t but attractive printed scales will be avail by the time this appears. The oscillator is between the gang and the speaker and aerial coil in the rear right corner.

Learn While You Build A Receiver

Here is the third section of our beginners' receiver, and the last as far as the electronic si goes, though we hope to describe the cabinet construction next month. In the meantime y will have plenty of opportunity to get the set going and properly adjusted.

by Philip Watson

This last section should not involve a great deal of effort and, assuming that what you have done so far is correct, you should be listening to stations within a few hours of obtaining the remaining few bits and pieces. Even on the basis of elementary alignment procedure, a very useful performance should still be possible.

This last portion of the set comprises the aerial tuned circuit, the local oscillator, and the mixer section. As with the earlier portions, it will help considerably if we know the why and the how of each before we start the actual construction.

Reverting briefly to last month's article, readers may remember our discussion concerning the intermediate frequency (IF) amplifier. This is centred around the 6BH5 valve and the two IF transformers, IFT1 and IFT2. It provides most of the gain and selectivity of the set and each incoming signal, as required, is converted to this frequency.

This month we are concerned with the means by which this frequency conversion is achieved, as well as the manner in which the signal is treated before conversion.

First the frequency conversion cess. As explained last month primary of IFT1 is connected d in the plate circuit of the 6AE8. this winding is tuned to the interm frequency of 455 Kc this is the on quency that will be readily accep it. All other frequencies will be re to a greater or lesser degree, dep on how far they depart from this

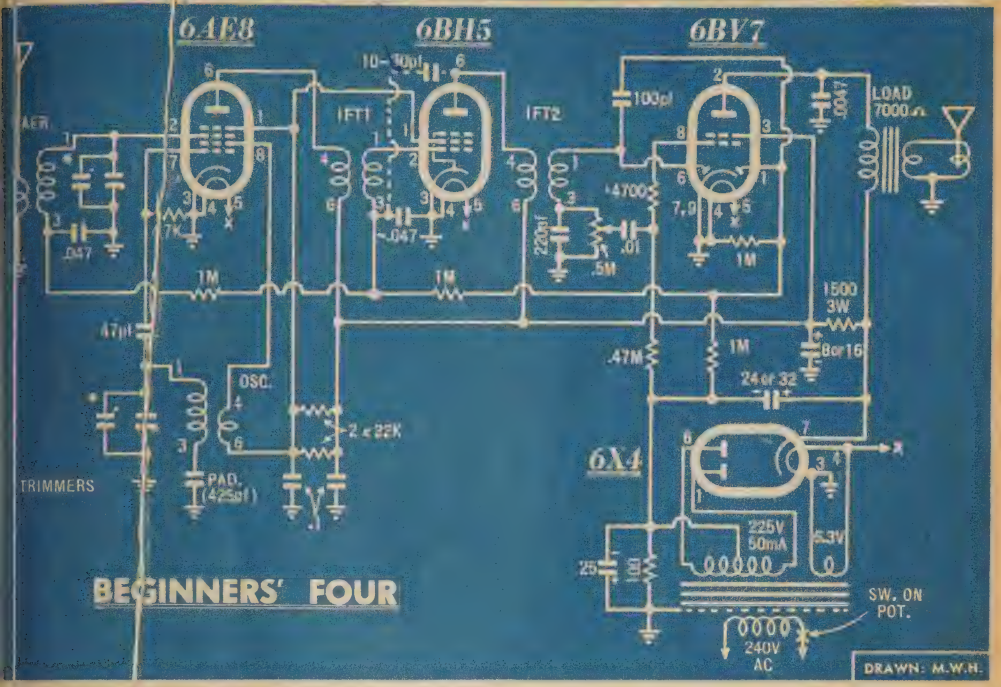
On the other hand, the signa into this valve (via the signal gri 2) will be from within the bro

band, covering approximately 5 1600 Kc. Unless something h within the valve, none of these would get beyond the plate circuit they would be rejected by the 4 winding. It is this "something" wh will now consider.

The 6AE8 is really two valves i a pentode and a triode. The p section comprises pin 2 (signal pin 1 (screen), and pin 6 (plate triode section comprises pin 7 (gri pin 8 (plate). The cathode (pin common to both sections.

These two sections are substa independent of one another, exc a small amount of coupling delib introduced. This is in the form extra grid in the pentode section, is internally connected to the

THIRD SECTION — AERIAL & OSCILLATOR STAGES



The completed circuit, showing the addition of the oscillator and aerial circuits. Note the neutralising capacitor in the 6BH6 circuit. This is a useful device to remove any last trace of instability due to inadvertent layout variations. Try to wire the last section from this circuit alone.

id Thus any signals present in the
e section will also appear in the
ntle section.

The job of the triode section is to
ncon as a "local oscillator," while
e entode is fundamentally a "mixer,"
hough it also contributes some
nplification to the incoming signal

This brings us to the actual process
frequency conversion. The basic
inple employed is that of mixing
o requencies together in such a way
I produce a new frequency. (In
ct,we produce at least two new fre-
eries, but we are only interested in
e f these.)

XMPLE

A simple example should help to
ak things clear. Assume that we have
e signal of 600 Kc and another of
5 Kc and that we feed these two
nis into a suitable mixing circuit. At
e utput of the mixing circuit we will
d the original 600 and 1055 Kc
nis, plus frequencies of 1655 Kc (the
m and 455 Kc (the difference).

It is fairly obvious that it is the
ference frequency we would require
th case, since it is the same as our
os intermediate frequency.

In practice the 600 Kc signal would
e incoming signal from the broad-
st tation, while the 1055 Kc signal
u be generated within the set itself
in the local oscillator circuit in fact.
e entode section of the 6AE8 per-

PARTS LIST

- 1 Chassis 9in. x 5½in. x 1½in.
- 1 Power Transformer 225V 50 mA. 6.3V 2A.
- 1 5in. loudspeaker type 5C.
- 1 Speaker transformer 7000 ohm, type EBG96.
- 1 6BV7 valve.
- 1 6X4 valve.
- 1 6BH5 valve.
- 1 6AE8 valve.
- 3 9 pin miniature valve sockets, wafer type for preference
- 1 Miniature 7 pin socket.
- 2 IF transformers Nos. 1 and 2 (Suit chassis cut-outs.)
- 1 7 tag terminal strip.
- 1 5 tag terminal strip.
- 2 4 tag terminal strips.
- 2 3 tag terminal strips.
- 3 ⅜in. grommets.
- 2 ½in. grommets.

Hook-up wire, 18 gauge tinned copper wire, 3 core power flex, 3 pin plug, nuts and bolts (2 countersunk for speaker mounting) solder lugs, solder, &c.

RESISTORS

- 4 1M ½W.
- 1 .5M potentiometer with single circuit switch.
- 1 .47M ½W.
- 1 47K ½W.
- 2 22K 1W.
- 1 4700 ohm ½W.
- 1 1500 ohm 3W.
- 1 100 ohm ½W.

CAPACITORS

- 1 32 mfd electro. 350PV.
- 1 25 mfd electro. 40PV.
- 1 16 mfd electro. 350PV.
- 2 .1 mfd 400V paper.
- 2 .047 mfd 200V paper.
- 1 .01 mfd paper 400V.
- 1 .0047 mfd paper 400V.
- 1 220 pf mica.
- 1 100 pf mica.

ADDITIONAL PARTS FOR THIS MONTH'S SECTION

- 1 Midget two gang tuning capacitor. 10-415 pf. Type RMG2 or similar.
- 1 425 pf mica capacitor (padder).
- 2 Trimmer capacitors.
- 1 Miniature aerial coil (Suit chassis cut-outs.)
- 1 Miniature oscillator coil. (Suit chassis cut-outs.)
- 1 Aerial terminal.
- 1 Calibrated knob 2½in. diam. with scale to suit State.
- 1 Small knob to match.
- 4 2in. x ⅛in. C/S screws.
- 12 extra ⅛ nuts.

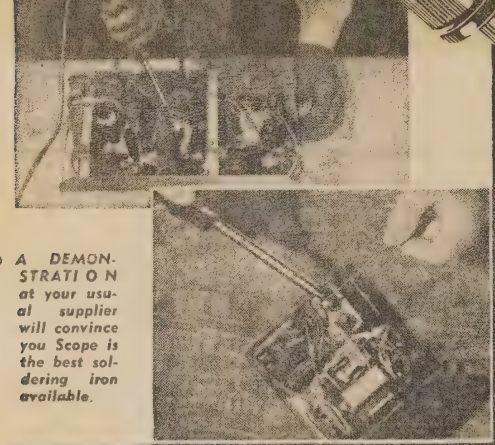
SCOPE...

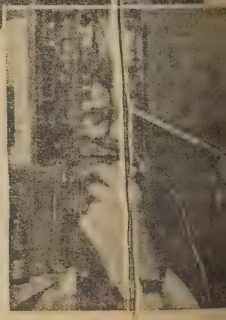
the most widely-used soldering iron in Australia

SCOPE LABORATORIES MELBOURNE

. . . is now exported to England and U.S.A.

The unique and versatile Scope Solder Iron owes its popularity to these time-s ing and dependable features—HEATS IN SECONDS . . . ready for continuous u Subsequent heating practically instant eous. SMALL DIMENSIONS AND LIG WEIGHT, only 3½ ozs., permit easy acc to awkward places. AMAZING SOLD ING SPEED ACHIEVED with a small which is used purely as a means of tra ferring the heat to the work . . . not as a reservoir of heat as w other irons. DOES NOT RADIA HEAT IN ALL DIRECTIONS heat is localised at the so tip. Soldering is poss in a maze of wiring the barrel is comp atively cool.





● *A DEMONSTRATION at your usual supplier will convince you Scope is the best soldering iron available.*

SMALL TIP makes Scope ideally suitable for Radio, Television and all electronic equipment soldering.
IS ABSOLUTELY SAFE. Scope operates on 2.5/6.3 volts AC or DC, through National Transformer (optionally supplied), or from a car battery.

Retail Price 50/-

National Transformer 49/7. Fully approved under Prescribed Articles of the Electricity Authority. Approval No. N/156.

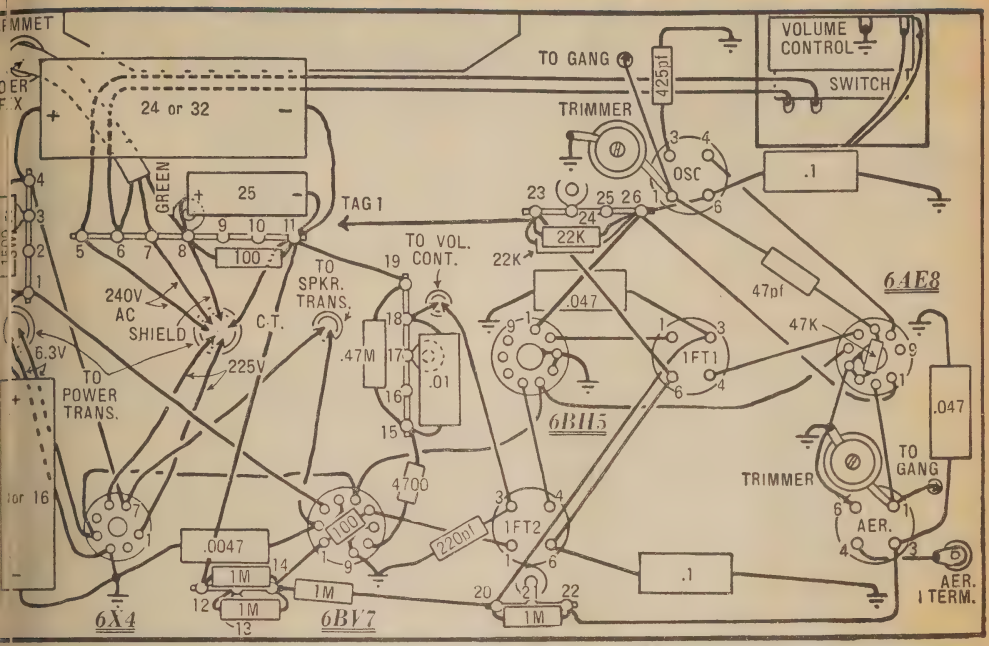
Australian & Overseas Agents:

Wm. J. McLELLAN & Co. Pty. Ltd.

126 SUSSEX ST., (just north of King St.) SYDNEY. BX1131

New Zealand Distributors: H. W. Clarke, Auckland and Wellington.

ADDITIONAL PARTS AND WIRING CLEARLY SHOWN



The placing and orientation of the aerial and oscillator coils are clearly shown in this layout diagram, along with the few minor parts still to be fitted. Note the trimmers mounted near each coil.

rs the mixing function and both old nd new frequencies appear at the plate. owever, because of the tuned circuit, nl the 455 Kc signal is passed on to ne next stage.

om this it can be readily appreci- e that the wanted signal is selected mply adjusting the local oscillator oduce the correct frequency; a fre- ncy always removed from the signal equency by 455 Kc. Thus, for a 00 Kc signal the local oscillator will e 1155 Kc, for 800 Kc, it will be 25 Kc, and so on.

DISADVANTAGES

Unfortunately, as with many bright hines, there are one or two catches. hese are not serious, but need to be ken into account. The main one is ouble spotting." Reverting to our rginal example, we saw that a 600 Kc gnal and a 1055 Kc local oscillation ould produce 455 Kc, the difference etween them.

It a frequency of 1510 will also beat it 1055 to produce 455, since this is lso the difference between these two requencies. Since the mixer has no eans of knowing which one is re- uired, both signals would appear in the F amplifier — and eventually the peaker — if the stations were within an of the receiver.

om the above, it can be readily ppreciated that a second spot is always removed from the wanted signal by exactly twice the IF.

Fortunately, the problem is not a difficult one on the broadcast band, though it presents some pretty tough problems on the higher frequency bands. We overcome it by providing a certain amount of "pre-selection," or rough tuning, ahead of the converter stage.

Common practice, and what we have done in this case, is to provide a coil (the aerial coil) and a tuning capacitor in the input (grid) circuit of the converter valve In the previous example, where a 600 Kc signal was selected by means of a 1055 Kc local oscillator signal, this pre-selector circuit would be adjusted to 600 Kc, thus tending to accept this frequency and reject all others.

SPECIFIC JOB

Admittedly, the ability of a single tuned circuit to reject adjacent signals is not particularly good, but this is not its prime role. The IF channel will look after this function and, in fact, it does provide most of the adjacent channel selectivity. But the second spot, being so far removed from the wanted signal, is easily rejected by the aerial circuit, and so never appears at the mixer grid

In very large receivers a stage of amplification is provided ahead of the converter, and two tuned circuits are used This gives even better second spot rejection (if it should be needed), contributes something to the adjacent channel rejection, and amplifies the signal before conversion. These advantages are most beneficial in remote country districts.

So far we have said very little about how the local oscillations are generated. In fact, a full explanation would probably take more space than we have available here, as well as being rather complex for the beginner. Nevertheless, a few points are worth considering.

OSCILLATOR SECTION

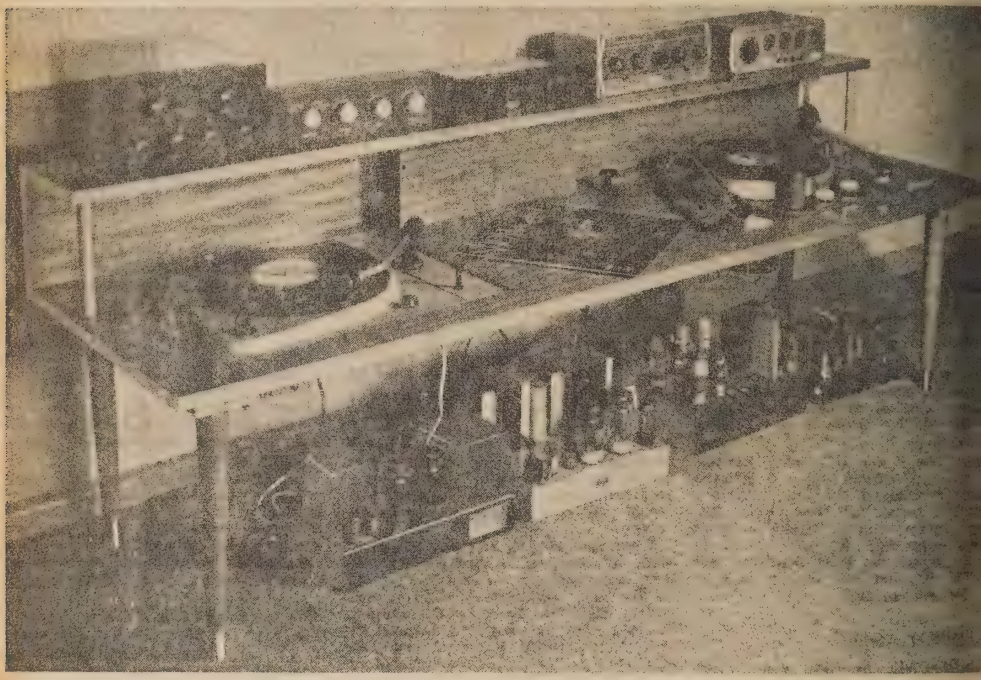
As we said earlier, the triode section of the 6AE8 performs this function. the elements involved being the cathode (pin 3), the triode grid (7), and the triode plate (8). To those already familiar with such circuits we would point out the similarity between this and the popular regenerative detector. The oscillator coil has a "plate" or "feedback" winding (lugs 4 and 6) and a "grid" winding (lugs 1 and 3) exactly as used in a regenerative or Reinartz coil.

There is a "grid leak" (.047M) and coupling capacitor (47 pf), while the grid winding is tuned by a variable capacitor, also exactly as in the regenerative circuit. And, finally, just as the regenerative circuit will oscillate when the coupling between plate and grid windings reaches a critical point, so will this circuit oscillate when conditions are right.

HI-FI

— An open invitation to talk Hi-Fi with the expert

Call, relax and enjoy REAL music in our Hi-Fi Auditoriu



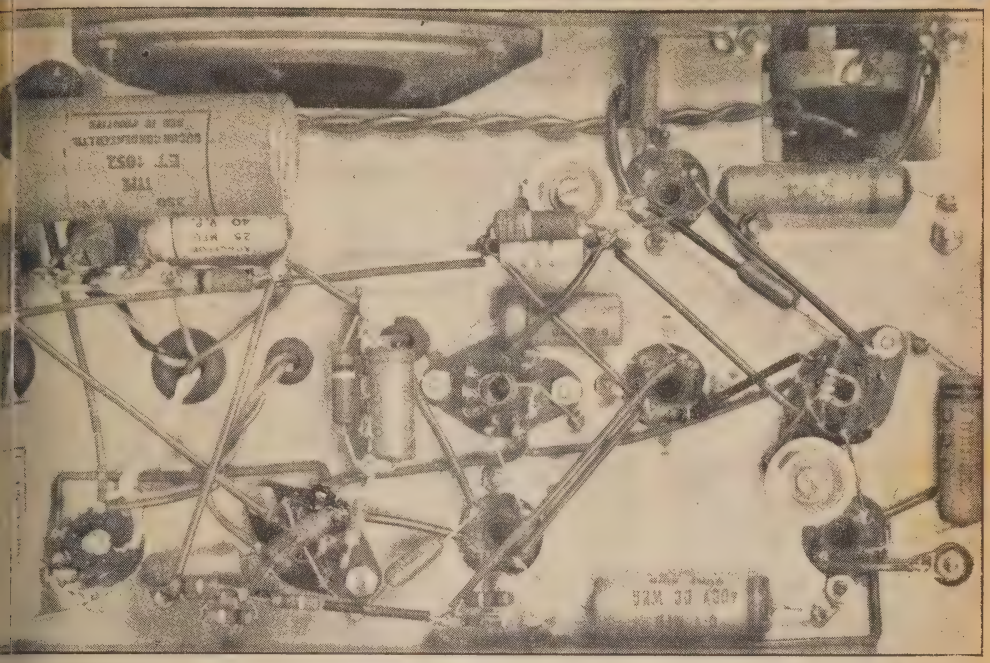
"We've everything for the Hi-Fi enthusiast here at Modular, and would welcome an opportunity to show you personally, in our High Fidelity auditorium, the wonderful units we can supply, also the big range of amplifiers, loudspeakers, record players and pickups. Next time you're around our way, why not drop in for a while and enjoy Hi-Fi the Modular way. Compare the various units and see how inexpensively you can achieve the finest sound.
For any Hi-Fi problem you may have, call or ring Modular and find out just how anxious we are to help you or advise you."

John Breakspear.

MODULAR
ELECTRONICS

579 Sydney Road, SEAFORTH
(Just near the Seaforth Post Office) **XJ7029**

THE COMPLETED WIRING SHOULD LOOK LIKE THIS



Compare this with the wiring diagram on page 51 for any minor details needing clarification. The aerial coil is in the bottom right corner and the oscillator coil at the top near the volume control.

See we want it to oscillate, we see
that conditions are right, from the
sh of the coil to the value of com-
nits and the voltages applied. Thus
djustment is necessary, the circuit
ates automatically immediately the
arms up.

Te exact frequency of oscillation,
hi determines the station we are to
ce, is governed by the inductance
he oscillator grid coil and the
pitance of the capacitor across it.
n the size of the coil is fixed and the
pitor variable it is fairly obvious
tve vary the capacitor to select our
tns.

Tis capacitor and the one used to
nthe aerial coil could be two separ-
nits, each one having to be separ-
el adjusted by the user. While simpli-
n the circuit design it would be bad
r the user's point of view, so these
ocomponents are combined in one
italled a "2 gang" (in this case) or a
ing" etc.

FERENT FUNCTIONS

Te ganging of these two functions
ents some problems, since the fre-
cy ranges are not the same in each
s but still have to be covered by two
rcal sections. Ensuring that each
ct tunes to its correct frequency at
ylial setting is known as "tracking."

most modern circuits tracking is
hved by careful selection of the oscil-
o coil inductance and by "padding"
uning capacitor with a carefully
ed amount of series capacitance.
is called the "padder" and is the
Sf between lug 3 and chassis.

Te foregoing is necessarily a brief description from which many small details have had to be omitted. However, it should provide a basis of understanding as to what goes on and the finer points may be filled in later.

Now let us consider the constructional side. The parts list gives full details of the extra parts you will require, but a few comments about the major ones should help those to whom they are unfamiliar.

THE GANG

The main items are a two-gang tuning capacitor, an aerial coil, oscillator coil and a couple of trimmers. We will deal with the gang and its mounting first.

This is a midget type, each section having a capacitance range of 10 to 415 pf, and it is suitable for either horizontal or vertical mounting. Although available with a "planetary" drive shaft, to provide a "vernier" control, the plain shaft is more suited to the dial we have chosen for this set.

To suit the particular cabinet style we have in mind it is necessary to mount the gang directly above the volume control. There are many ways in which it can be elevated above the chassis and those who care to may experiment with various metal brackets if they wish.

We simply used four only 2in x 1-8in countersunk screws, with the necessary extra nuts, to serve as supporting pillars. As well as being easy to obtain, these have the advantage of allowing small adjustments to the gang height if this should be necessary.

The gang feet need to be fitted so that they turn under the gang, with the longer section toward the speaker. Because of the restricted space between this and the underside of the gang at least one mounting hole in each foot needs to be countersunk before fitting. The distance between the volume control and gang shafts should be 2¼in approximately.

The gang, as purchased, will have alternative sets of mounting holes for both horizontal and left or right-hand vertical mounting. Some of these holes may be tapped 1-8in Whitworth, but others, including the ones we need, may not be tapped.

In this case the best approach is to use self-tapping screws and, in fact, the makers are arranging to supply a set of these with all future gangs, as well as bulk supplies to all dealers at present holding stocks.

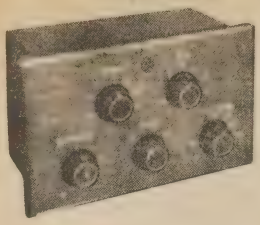
In addition, the agent for these gangs, Watkin Wynne Pty. Ltd., 173 Pacific Highway, North Sydney, will be holding stocks of screws and will forward a set gratis to anyone already possessing a gang.

THE SIZE

However, if you prefer to purchase them, the type required is a No. 4 x 3-16in, either countersunk or round head. Longer types should be avoided, since there is a risk that they will foul the fixed plates. However, in an emergency, ¼in types could be used by putting a washer under the head.

In handling the gang, take care that nothing is done to cause the frame to be distorted, otherwise the very close spacing between the plates will be upset, with the danger that they may short over part or all of the rotation.

Electrically a tuning gang is quite



CONTROL UNIT

RD JUNIOR THE FINEST MEDIUM-PRICED AMPLIFIER IN THE WORLD

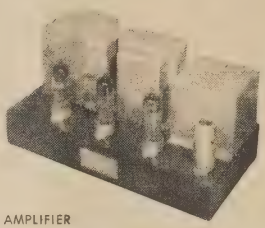
It's no wonder that since it was first introduced, the RD Junior has achieve and maintained world leadership in the medium priced amplifier fiel Superb workmanship and attractive styling, combined with a comprehensiv specification and quite new method of construction contribute to the Rodgers R Junior's incredibly low price in relation to its top line Hi-Fi performanc

- "Ultra Linear" output stage.
- Output Transformer with grain orientated laminations.
- Exceptional power/frequency response curve.
- Unique "Impedance Plug" speaker matching.
- Four Record Characteristics.
- Two Radio Inputs.
- Provision for microphone.
- Switched Bass and variable Treble controls.

MADE IN ENGLAND

Demonstrations and Supplies Available from

NEW SOUTH WALES: United Radio Distributors Pty. Ltd., Audio Engineers Pty. Ltd
VICTORIA: Homecrafts Pty. Ltd., Radio Parts Pty. Ltd., Warburton, Franki (Melbourne) Ltd.
SOUTH AUSTRALIA: Gerard & Goodman Ltd., Newton McLaren Ltd., Radio Electric Wholesalers Ltd.
QUEENSLAND: Chandlers Pty. Ltd.
WESTERN AUSTRALIA: Atkins (W.A.) Ltd., Leroya Industries Pty. Ltd.



AMPLIFIER

TECHNICAL SPECIFICATIONS

Frequency Response:	± 1 db 30-20,000 cps 10 watts .12 p.c. at 1 kcs. 12 watts .2 p.c. at 1 kcs.
Hum and Noise:	— 85 db below 8 watts.
Output Impedance:	12-16 ohms. 6-8 ohms. 2-3 ohms.
Spare Power:	285V. at 40 m/A.c. 3V.2.5A.
Overall Dimensions:	11" long, 6" deep, 5¼" high.
Weight:	15 lbs.
Operating Voltage:	200-230-250V. 50 cps.

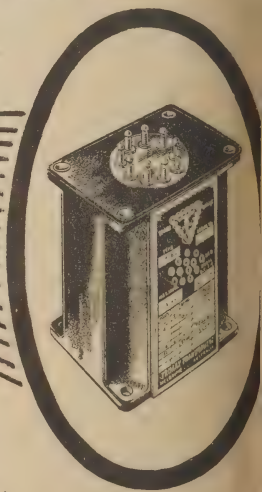
Sole Australian Agent:

BRITISH MERCHANDISING PTY. LTD.

BOX 3456 G.P.O. SYDNEY

TRIMAX IS WAY AHEAD IN RELIABILITY PERFORMANCE & QUALITY!

Choose TRIMAX because exhaustive technical research, modern methods of manufacture and rigid performance tests guarantee you a thoroughly reliable product



OUR RANGE INCLUDES:

- IGNITION Transformers
- POWER Transformers
- AUDIO Transformers
- CURRENT Transformers
- AUDIO Amplifiers
- POWER Amplifiers
- IGNITION COILS
- POWER & AUDIO CHOKES
- ELECTRICAL CONNECTORS
- MICROPHONE STANDS
- TEST EQUIPMENT
- SOLENOIDS
- TV & RADIO Protective Metal Work, etc.

TRIMAX TRANSFORMERS PTY. LTD

AGENTS IN ALL STATES

CNR. WILLIAMS RD. & CHARLES ST., NORTH COBURG, VIC. Phone FL12

but possibly a little confusing to not familiar with it. One set of but moving ones, is connected to the frame, so that the act of ng the gang on the main chassis is lt is required to complete this side circuit.

fixed plates are insulated from the and the insulating blocks on they are mounted are easily recog-

A solder lug is provided at each each set of plates and either one be used, according to which is to the appropriate circuit.

symbol for the tuning capacitor lar to that for a fixed capacitor, that one plate is shown curved ith a small arrow head. This is ving plate and is invariably shown ted directly to chassis. In our he front section is used for the or and the rear section for the

A lead from each section passes h a hole in the chassis near the ive coils.

aerial and oscillator coils are ed in the two remaining chassis and orientated according to the diagram. The aerial terminal is in the hole alongside the aerial are being taken to see that it is ly insulated from the chassis, using ulating washer provided.

MARKINGS

with the IF transformers the coil may be marked in a number of but the most usual arrangement is to that we gave last month for s and is as follows:

al coil—Pin 1, grid. Pin 3, AVC. aerial. Pin 6, earth.

llator coil—Pin 1, osc. grid. Pin der. Pin 4, osc. plate. Pin 6, HT.

wiring is next and the first thing is to remove the temporary test and components we fitted last That done, it should be less n evening's work to fit the final nent wiring.

e again we suggest you try to the requirements directly from rcuit, but we will still detail the portion of it as a guide in case fusion.

suggest you start with the oscil- ircuit. The .1 mf previously con- to tag 26 now connects directly 6 of the oscillator coil, while an nal lead runs from this lug to

425 pf padder connects between and chassis, a solder lug under a the gang support screw providing dy connecting point. From lug 1 are three leads. One is a length ok-up wire that runs through the ss to the front section of the gang, cond is the 47 pf capacitor con- g to pin 7 of the 6AE8, and the is the trimmer.

ARITY

ore connecting the latter it is neces- o identify the "active" and "earth" s. Inspection will show that one of ates is in direct contact with the ing screw, and this is the earth . The opposite lug is the active and one we connect to the oscillator . A solder lug mounted under the nf tag 24 provides a chassis con- n for the earth side.

remaining coil connection, lug 4, nected directly to 6AE8 pin 8, and mpletes the oscillator coil wiring. 4 of the aerial coil is connected y to the aerial terminal, while lug 3 connects to tag 22 and one end of the .047 mfd capacitor, which lies along the edge of the chassis. Incidentally, there is a right and wrong way to connect these bypass capacitors. The end having a band around the label, or marked "shielded end" or something similar, is the one connected to chassis where a chassis connection is called for in the circuit.

Lug 3 is similar to lug 1 of the oscillator in that it has three leads connecting to it. One is a length of hook-up wire running through the chassis to the rear section of the gang, one goes to 6AE8, pin 2, and the third is another trimmer. The same polarity must be observed here as for the oscillator trimmer. Lug 6 connects directly to chassis.

This completes the coil connections, but there is one more component to fit. This is a 47K ½W resistor and it mounts directly under the 6AE8 socket between pins 7 and 3.

And, believe it or not, that completes the job.

CHECKING

Check everything over carefully, remove any stray blobs of solder, set the trimmers at about the middle of their travel and switch on. If all is well the set should sound definitely alive when an aerial is attached, and rotating the dial should bring in the local stations at least.

The next logical step is to carry out some form of alignment, if only of a rough nature, and there are various approaches to this problem. The most important part is the IF channel, and we discussed some aspects of this last month. If this has already been checked the remaining task is comparatively simple, and may be performed quite effectively without any special equipment.

If the IF channel has not yet been checked, this would be as good a time as any to think about getting it done, and it should be possible to find someone who will undertake the job. If this is not possible at this stage, we will suggest an alternative approach a little later on, but a proper job is to be preferred.

NEUTRALISING

Note particularly that if, during the alignment process, the set shows any tendency toward instability, a small value of neutralising capacitance should be added as shown dotted in the circuit. This should be between 10 and 30 pf, the lower value usually being sufficient. Fairly obviously, the IF transformer involved will have to be realigned when the capacitance is added.

If the IF channel can be adjusted on a correct basis this is best done before the aerial and oscillator adjustments are touched. However, if this job has to be done without proper equipment on a temporary basis, it is best left until after the aerial and oscillator circuits are adjusted. This latter operation will now be discussed.

The dial should be fitted, and some kind of a temporary pointer rigged up until the set is fitted into a cabinet. The dial itself is a simple but effective unit. Approximately 2½in in diameter and made from clear plastic, it carries the station calibrations on a gold label fitted from the back. A variety of labels is available to suit the various States.

Although a direct drive knob, the

(Continued on Page 128)

The RADIOMASTER

RADIOGRAM CHASSIS . . .

A great performer on Radio and Records

HI-FI MODEL E22 reproduces perfect high treble notes and bass notes without "drumming" or distortion — brings recorded sound to your home as near as possible to the original. A high gain R.F. stage ensures satisfactory long distance radio reception Features include:-

Treble and bass boost with separate controls Two matched Jensen speakers (12in and 6in). Eight valves, world range. Push-pull output Provision for tape recorder Latest type Radiotron valves Custom built. Six months' guarantee Frequency coverage: 40 to 13,500 cycles Design tested and approved by the Valve Application Division of Amalgamated Wireless (A'sia) Ltd.

PRICE **£41/15/-**

Magic Eye tuning indicator 30/- extra.

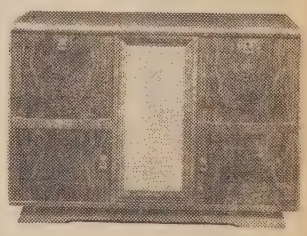
Packing included. Freight extra.

Other Radiomaster Radiogram chassis are available from **£23/15/-**

TELEVISION CHASSIS

21in. models from **£125**

RADIOGRAM and TV CABINETS



Many popular designs available including contemporary in natural maple.

New Cabinet Models for Hi-Fi Chassis incorporate vented speaker enclosures. First-class finish

ALL TYPES OF FOUR-SPEED RADIOGRAM UNITS

WRITE FOR CATALOGUE

H. B. RADIO PRODUCTS

103-105 Catherine Street,

Leichhardt, SYDNEY

Telephone LM5580

TV COMPONENTS

MAGRATHS

OFFER YOU A DEPENDABLE RANGE OF TV COMPONENTS, ESPECIALLY MADE AND TESTED FOR AUSTRALIAN CONDITIONS, SO THAT YOU CAN **BUILD YOUR OWN TV RECEIVER!**

"CYLDON" TURRET TUNER

FULLY LOADED FOR 10 AUSTRALIAN CHANNELS!

Completely assembled with Valves. FULLY TESTED and ready FOR IMMEDIATE WORK!

NEXT DELIVERY—AUGUST/SEPT.

£12/14/9

INCLUDING SALES TAX

AEGIS COIL ASSEMBLIES (not illus.) HM731—Can & Base .. **7/6**

AEGIS TV and I.F. STRIP (not illus.) Completely wired and ready for immediate use .. **£16/6/9**

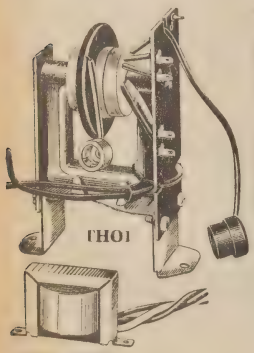
CYLDO TURRE TUNER

AEGIS UNWIRED SOUND AND VIDEO STRIP

(illus. bottom right) K7TV: designed primarily for the home constructor and ESPECIALLY for RADIO & HOBBIES TELEVISION SET! Full winding details are supplied with each kit. Comprises:—punched and plated chassis, 7 unwound I.F. transformer assemblies complete and attached, 4 x 9-pin valve sockets, 3x 7-pin valve sockets, 6 terminal strips all attached; 4ft 24-gauge wire, 24ft 28-gauge wire, 50ft 30-gauge wire, 22ft 36-gauge wire, 1 bottle Q-kote B.

78/9

Including Sales Tax

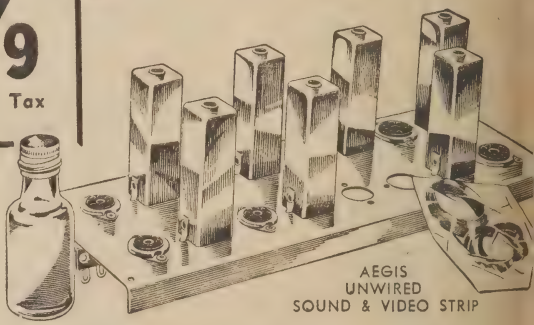


THO1

TVB1 40066

OTHER Television Components include:

THO1 Horizontal Output Transformer (illus.);
TVB1 40066 Vertical Blocking Oscillator Transformer (illus.)
TVO1 40068A Vertical Output Transformer;
400 10-C7 Deflection Coil;
40405 Centring Magnet;
40247 Ion Trap Magnet;
40050 Sine Wave Coil;
40048 Line Linearity Coil
40047A Line Oscillator Coil; etc.



AEGIS UNWIRED SOUND & VIDEO STRIP

- ***WE STOCK THE FULL AEGIS RANGE OF RADIO PRODUCTS!***
- AEGIS ARE ACKNOWLEDGED LEADERS IN BROADCAST COILS & I.F.'s; EXTENSION SPEAKERS, FILTERS, CHOKES, TUNING AND INSTRUMENT KNOBS, ETC.

SEE OUR FULL RANGE OF OTHER TELEVISION COMPONENTS including ALL METAL WARE!

J. H. MAGRATH & CO. PTY. LTD.,
208 LT. LONSDALE ST., MELB., VIC. FB3731

FROM THE SERVICEMAN WHO TELLS

V is the main subject this month, with problems ranging from how to dispose of a defunct icture tube to how to switch off a TV set correctly. And if the latter statement seems a trifle pointless I suggest you reserve judgment until I have had a chance to explain.

he point about disposing of defunct re tubes is raised by Mr A. J. N. oorooka, Queensland. He writes as ll vs:

t a tech. class discussion we re- l that sooner or later a service- would be faced with the disposal em of a U/S picture tube. One ot just throw it on the rubbish . It must be first of all de-loused. uestion: What is a safe procedure he disposal of such tubes?

ersonally, I'd put it in a strong d box with the pin end sticking saw or gently break off the bake- ase, then break the exposed glass

owever, I don't want myself or ne else hurt, so what cooks?

won't bore you with all the ways sted, from serious to rude, but watch your talks for anything of test."

I find it rather difficult to decide ther this is an example of keen ght or extreme pessimism on the ir's part. After all, TV hasn't even d in Queensland yet, and here they worrying about what to do with e worn-out picture tubes.

I can only assume that, to people ethodical as this, the (to me) ever- g problem of what to do with azor blades has been solved long

GICAL THOUGHT

Which leads, quite naturally, to the ght that some of the ideas for sing of old razor blades might also mployed for picture tubes. I have heard it suggested that a fitting for some of the precocious, spoiled, otherwise objectionable children one counters would be to give them a py of old razor blades to play with. e theory is that, sooner or later, will cut something vital.

the same token, an old picture might be extremely useful in the role, particularly if one had the ght to include a hammer with the

Seriously, though, A.J.N. has raised ry important point. These devices not—in fact, must not—be simply ded as one discards an old valve. essential that they be rendered less first. Anyone failing to do could face a serious charge in the of someone being injured—as well aving a very gruesome accident on conscience.

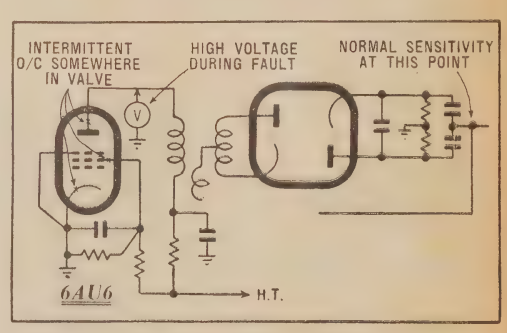
his problem has already been en- ered overseas and my correspon- will be happy to learn that the od he suggests is almost identical that often used. The regular car- for these tubes is suggested as the ective container, and a small circu- ole is cut in the top to accom- ate the base. Cloth packing under the tube face is used to raise the tube sufficiently to allow the base to protrude an inch or so above the box.

The exhaust tip may now be broken either by simply breaking off the key on the base, or by drilling a small hole in the end of the key and inserting a small screwdriver and breaking the extreme tip.

Apparently it is customary overseas to de-activate picture tubes, in certain circumstances, even where they are merely being returned for credit or, presumably, reconditioning. In such cases the air must be admitted very slowly, otherwise the coating will be blown off the screen by the force of the blast and the credit value seriously reduced. This appears to be the reason for the technique of trying to break off the extreme tip only.

So there it is, A.J.N., and I hope that this information will be of interest to yourself and your fellow students.

One of my more interesting faults this month concerned a TV set with an intermittent sound channel. The call came late one evening just as I was about to shut up shop for the day, the owner wanting to know whether I could possibly do something to restore the sound in time for his favourite program later in the evening. (There was no mention of an intermittent condition at this stage.)



The portion of the set concerned with the intermittent sound problem. Sensitivity was normal at the output of the detector, but an abnormally high plate voltage on the limiter stage suggested that this valve was not drawing current. The condition was sensitive to almost any kind of electrical shock.

Since it was not far out of my way, I decided to drop in on my way home and see what could be done, at least in the way of emergency repairs, until I could tackle the job properly on the morrow. I was encouraged by the fact that the sound was, according to the owner, completely dead, and there is nothing I like better than a fault which declares itself and doesn't "muck about."

Arriving at the house I was greeted at the door by the owner, who explained that he had just arrived home from work, switched on the set, and discovered that he had picture but no sound. Fearful that something might be damaged by this mode of operation he had switched off again, and rung me for assistance.

I switched the set on and we waited while it warmed up. When it did it performed exactly as had been described; a perfect picture, but not a trace of sound. Feeling that whatever it was it should be pretty obvious I was about to delve into the back of the cabinet when the owner's teenage son appeared on the scene.

Summing up the situation with a rapidity characteristic of the modern youth, he immediately enquired:

"Having trouble with the sound Dad?"

When his father, obviously somewhat taken aback, confirmed this, he went on:

"Aw, that's nothin'. Its been like that over a week now."

"But you were using the set last night."

"I know—" (this with an air of patient irritation) "—but its easy enough to fix. I've been fixing it ever since it first went bung."

His father looked at me for a moment—a look which conveyed a sense of bewilderment and exasperation all at once—then turned to his son again:

"You've been fixing it. How?"

"Easy. Like this." And he reached over to the VOLUME/ON-OFF knob, snapped the power off and on again quickly, then advanced the volume—and there was the sound—loud and clear.

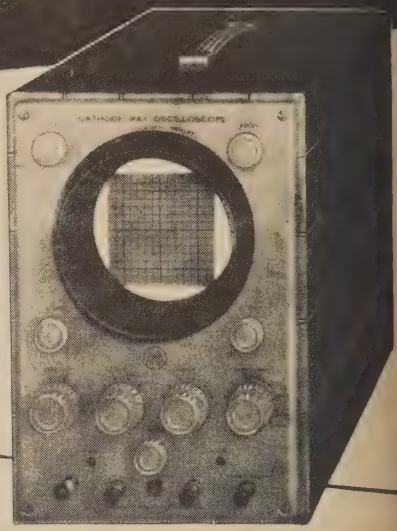
"Nothing to it," he said. "It'll be right for the rest of the night now—if you don't switch it off. If you do, you'll just have to flick it again when it warms up."

I half expected him to hold out his hand for his fee after that episode. Instead, apparently sensing that his approach may not have been the most diplomatic, he staged a graceful retreat.

His father looked at me, smiled weakly, and shook his head.

"Well, that's the younger generation for you. Seems I don't even know what goes on in my own house; though I

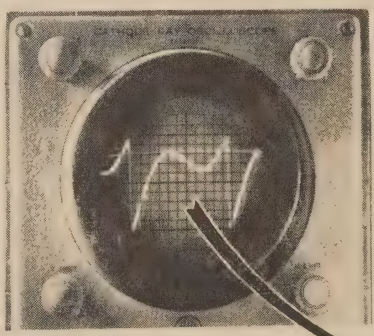
In your TV Servicing use the AWA Oscilloscope Type IA56031



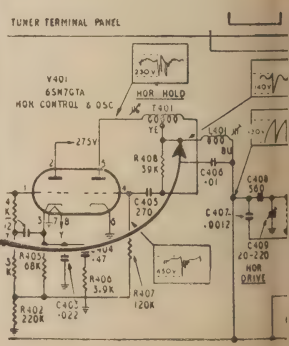
...for a STEADY, CLEAR, ACCURATE FLICKERLESS READING

FEATURES:

- Frequency Range D.C. to 1 Mc/s.
- Identical Vertical and Horizontal Amplifiers.
- Time base 30 c/s to 30 kc/s.
- Preset time base position for TV vertical and horizontal pulses.
- Sensitivity 30 mv/inch peak to peak.
- Built-in calibrating voltage.



Above is an unretouched photograph of a typical wave form found in the horizontal oscillator section of a TV Receiver.



Contact Test and Measuring Instrument Department :—

AMALGAMATED WIRELESS (AUSTRALASIA) LIMITE

SYDNEY	MELBOURNE	PERTH	BRISBANE	WELLINGTON, N.Z.
B 0233	MU 9161	BA 5945	J 1631	43-131

ES20.5

admit I seldom switch it on my-

e looked at the set for a moment then went on, "Now it seems I've d you out on a wild goose chase, I'm blowed if I know how he fixed

f it's any consolation to you," I ed, "I don't know either — yet. And r its being fixed, and while I hate teal your son's thunder, I'm afraid he has done can only be regarded very temporary cure. The fault undoubtedly get worse as time goes probably failing completely at the inconvenient time."

MPORARY RESPITE

went on to suggest that, since the was working — and assuming our ling Marconi's prediction was cor- — it be left strictly alone for the of the evening, and that I would it up in the morning. This seemed e most convenient all round. The r would see his program, and I ld obtain a few hours grace.

had no desire to start tracking down ntermittent in the customer's home at hour of the night. On the basis alves alone there would be five to k; sound IF, limiter, discriminator, , and output stage, to say nothing veral dozen minor bits and pieces. sides, Mrs Serviceman had promised e piece of choice steak for tea.

ext morning I collected the set and ared to give it a once over on the h. If all went according to pre- reports, I had only to switch on cold in order to observe the fault. certheless, I decided to go over it in case there was something ob- I could pick with the multi-meter.

spent the next 15 minutes checking thing checkable, but drew a com- blank. Even so, a test of this kind ten most rewarding, and the time spent.

e next thing was to switch on and that the fault would perform larly as before. But it was not to As it warmed up the sound came gh loud and clear without the test hesitation.

ouldn't it?

ELENTED

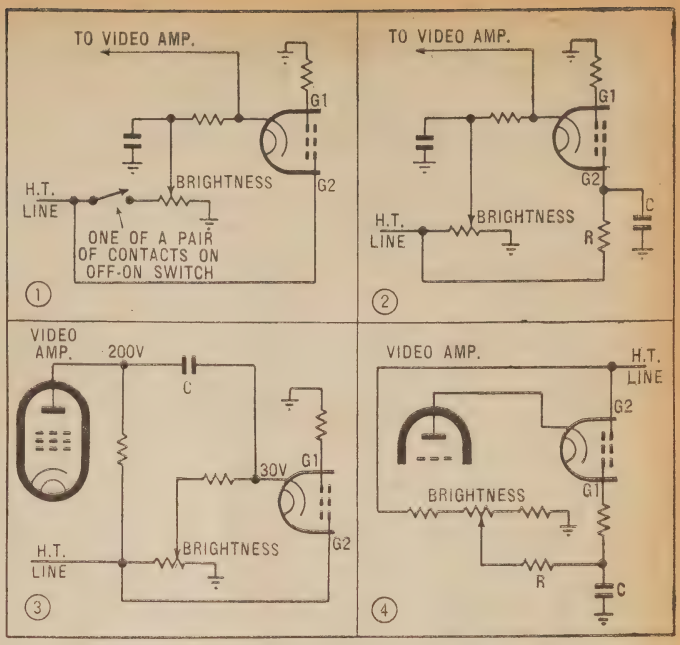
lowever, it apparently relented be- e, just as I was about to start a of prodding and bashing, it failed ts own accord. (So much for the bility of young Marconi's method repair.")

finger on the hot end of the vol- control produced a healthy blurp the speaker, thus establishing that audio system was O.K. Similarly, thing seemed to be in order right to the discriminator.

hat next? Logically the 6AL5 dis- inator, but I decided to take a ce and by-pass this stage. After it is a relatively simple valve, mak- he chances of complete failure less with most other types.

I went straight to the 6AU6 lim- The plate voltage was much high- han it should have been, almost to the HT voltage, and suggesting the plate circuit was not passing current.

e screen voltage was normal, but appeared to be taken from a volt- divider network and so was not icularly indicative of the screen be-



Four different methods of "spot swallowing" are shown here. (1) A spare set of contacts on the main switch removes the positive voltage from the cathode more rapidly than from the other electrodes. (2) The de-coupling components "R" and "C" allow the voltage on G2 to be retained for a longer period. (3) A natural negative kick is given to the cathode by reason of the charge stored in the coupling capacitor "C". (4) Where the grid is normally supplied with positive voltage a de-coupling network retains this for a longer period.

haviour. The cathode connected directly to chassis.

Since voltage was being applied to both plate and screen and there were no components in the cathode circuit, it seemed most likely that the valve itself was at fault. It could have an open plate connection, an open cathode connection, or even an open screen. All would give similar symptoms.

I was on the point of fitting another 6AU6 when the sound very obligingly came good again. (It is a long time since I had an intermittent which was so considerate.) The plate voltage immediately dropped to normal, providing further confirmation—if it was needed—of my theory.

There seemed to be nothing else to do now but fit a new 6AU6, which I did, following it up with a prolonged bench test consisting of a number of "on-off" cycles similar to those which revealed the fault initially. While I had no doubt in my own mind that the 6AU6 was the culprit, bitter experience has taught me never to take things like this for granted.

TESTED OK

When these tests revealed no sign of the fault, I took it back to the owner, checked it again in its own location, and told the owner I did not expect him to have any more trouble of that nature. I also took the opportunity to tell him how the fault had worsened while I was checking it and emphasising once again how easily he could have experienced a complete failure at a most inconvenient time

"I know," he replied, "and I will certainly let you know immediately if any troubles occur again. That is," he added, with some feeling, "if anybody gets around to telling me when it is faulty."

As to the actual nature of the fault in the 6AU6, I'm afraid this must remain a matter for conjecture. It seems fairly certain that one of the electrode connections was intermittent internally, probably due to a faulty weld, but it is difficult to say exactly why it should respond to the "switch off-switch on" technique and, apparently, only after the set had warmed up.

My guess is that the sudden application of plate voltage caused the two sides of the break to be drawn together due to electrostatic attraction, but that this would only occur when the valve was warm and the metal parts had expanded sufficiently to reduce the gap to microscopic proportions. Alternatively, it may have been because it was not possible to apply a voltage to the two parts until the valve was warm and the cathode stream available to complete part of the circuit.

Again, it may have been a combination of these and other factors. The important point being, I think, to realise just how erratic faults like this can be. As with the notorious intermittent paper capacitor almost anything, from switching the set off or on, to a click from a refrigerator motor, is sufficient to either create or cure the fault. Unfortunately, the trouble is not peculiar to capacitors.

Homecrafts PTY LTD

FOR RADIO, TV AND HOBBIES

290 LONSDALE STREET, MELBOURNE—FB3711

CONQUEST — the new Collaro 4 speed automatic record changer £18/17/6

Q PLUS CRYSTAL set complete with headphones and aerial £4/19/6

Q PLUS HIGH IMPEDANCE HEADPHONES 41/-

PARTS FOR R. and H. TV

CHS1 Horizontal Sine Wave Coil 8/7
CHW1 Horizontal Width Coil 11/
CHW2 Horizontal Width Coil 12/1
CHL1 Horizontal Linearity Coil 9/6
THB1 Horizontal Blocking Oscillator Transformer .. 12/4
THO1 E.H.T. Transformer £3/7/1
THO2 (90 deg.) E.H.T. Transformer £3/9/9
Y70D1 70 deg. Deflection Yoke, £4/12/8
Y90D1 90 deg. Deflection Yoke, £5/17/2

And all other parts, including Chassis and E.H.T. Boxes.

VARIABLE CAPACITORS

ROBLAN MIDGET.
Single gang 31/-
2 gang RMG.2 ..... 36/6
3 gang RMG.3 ..... 39/-
2 gang vernier drive 36/-
3 gang vernier drive 45/-
2 gang FM 39/-

A.W.A. STANDARD.
Single gang 22/-
2 gang 29/3
3 gang 39/-

A.W.A. MIDGET.
2 gang 28/6
3 gang 37/6

R.C.S. 100 pf reaction capacitor CV40 ..... 17/3

PICK-UP CARTRIDGES.

Collaro Studio "O" 70/-
Collaro PX Hi-Fi 73/6
Acos HGP37-IC 58/6
Acos HGP37-ID 58/6
Acos HGP39 std. or LP head 72/6
Garrard GC2 ..... 64/-
Collaro Studio "O" plug-in head, complete 105/-
Philips AG3010 head 31/6
Philips AG3012 Hi-Fi std. . 31/6
Philips AG3013 Hi-Fi LP... 31/6
Philips AG3015 LP, diamond 107/6

Collaro Hi Fi **PRECISION** 4-**SPEED TURNTABLE** with wide range PX pick-up £32/2/6

SAPPHIRE REPLACEMENT STYLII to suit Collaro, BSR, Garrard, velvet action record changers and players, easy to fit yourself ..... 13/6 each

DIAMOND STYLII for Collaro, BSR, Garrard players and changers £7
For Dual players and changers, std. sapphire, LP diamond, ... £7/11/6

SHER ¼in 230v AC power drill £12/10/-

DUCON HIGHSEAL TUBULAR CAPACITORS

.001/600	1/3
.0022/600	1/3
.0033/600	1/3
.0047/600	1/3
.01/200	1/3
.01/600	1/4
.022/600	1/6
.1/200	1/4
.1/400	1/9
.1/600	2/-
.22/200	2/-
.27/200	2/5
.27/400	2/6
.27/600	3/2
.47/200	2/8
.47/400	3/2
.47/600	4/2
.56/200	2/8
.56/600	4/9

ELECTROLYTICS

8 mfd/125v	5/-
8 mfd/350v	5/1
8 mfd/525v	5/6
8 mfd/600v	6/5
16 mfd/350v	6/3
16 mfd/525v	7/4
16 mfd/600v	8/8
24 mfd/350v	6/9
24 mfd/525v	8/9
24 mfd/600v	10/-
32 mfd/350v	7/4
50 mfd/525v	15/3
100 mfd/65v	7/6
100 mfd/40v	6/4
50 mfd/40v	5/1
25 mfd/40v	4/1
250 mfd/12v	6/4
1000 mfd/12v	10/-

SIMPLEX CERAMIC (HIGH VOLTAGE) BEADS AND DISCS.

12 pf/1000v	6/5
47 pf/1000v	6/5
56 pf/1000v	6/5
82 pf/1000v	6/5
110 pf/1000v	6/5
270 pf/1000v	6/5
(Also available in 5000 VW)	

It is new! "PRESTO" 230 V INSTANT SOLDERING GUN, £6/10/-

SCOPE SOLDERING IRON SPARES.

Carbons	1/-
Bits	10d
Bakelite handles	15/4
Flex heads	8/4
Centre rod assemblies	8/4
Steel barrels	8/4
Ceramic beads	4d
Retaining nuts	1/3
Switch rings	1/8

TV INSTALLATION ACCESSORIES.

No. 1 chimney bracket kit single wire type	55/8
No. 3 chimney bracket kit, single strap type	58/6
No. 4 chimney bracket kit, double strap type	73/7
Acme flash wall outlet	4/3
Skyline std. wall outlet	6/9
Nail type stand-off insulators. Per doz.	18/-
Mast type stand-off insulators. Per doz.	30/-
Wood screw type stand-off insulators. Per doz.	21/-
Gutter clips. Each	1/-
TV lightning arrestor	16/8

SHER Jig Saw attachment, easy to fit to ¼in drill. £4/18/6

Q PLUS COILS AND IF TRANSFORMERS

AC.1 min. N1 aerial band. pass	18/6
AC.3 min. N2 aerial band. pass.	20/3
AC. 2 min. car radio aerial coil	20/3
AC. 5 std. aerial high gain N1 band. pass.	20/3
AC. 9 std. aerial high gain N2 band. pass.	20/3
AC. 4 T unshielded aerial coil	15/2
AC. 7 std. car radio aerial coil	25/-
0.1 resistor wound (1R5) osc. coil min.	10/8
0.2 min. osc. coil (1R5, 6J8, etc)	18/6
0.4 min. osc. coil (X61M, 6AN7 etc)	18/6
0.5 min. osc. coil (6BE6. 6SA7)	18/6
0.7 std. osc. coil (6A8, 6J8, etc)	18/6
0.8 std. osc. coil (6BE6, 6SA7)	18/6
0.9 std. osc. coil (6AN7, ECH33, X61M)	18/6
0.10 1600 KC Min. osc. coil	20/3
0.11 1600KC std. osc. coil	20/3
O.M.E. tape recorder bias osc. coil	32/-
ICI Car radio ignition dash-filter	4/-
RCI Min. RF coil	18/6
R.C.2 min. Car radio RF	20/3
R.C. 3 Min. RF with reaction	20/3
R.C.4 std. medium gain RF	18/6
R.C.5 std. high gain RF	18/6
R.C.6 Min. Reinartz coil	20/3
R.C.8 std. Reinartz coil	20/3
R.C.9 16 MH RF choke	5/1
IF 8 No. 1 std. IF	27/4
IF 9 No. 2 std. IF	27/4
IF 40 No. 1 Min. IF	26/-
IF 42 No. 2 Min. RF	26/-
IF 14 and 15 1900Kc std. IF	27/4
IF 25 std. high selectivity, low gain	31/9
IF 26 std. high selectivity low gain	31/9

CRYSTAL SET KIT complete with circuit diagram, headphone and aerial wire £3/19/6

MULTIMETER PARTS

0-1 mA multimeter scale, 1000 ohm per volt university meter, £5/10/-
10 mA shunt 12/-
50 mA shunt 12/-
100 mA shunt 12/-
250 mA shunt 12/-
1 amp shunt 18/-
14.8 ohm shunt 12/-
166.6 ohm shunt 12/-
1% 4—stab. 1 watt resistors 9/9
1mA meter rectifier 42/6

TV CONSTRUCTOR PARTS

Philips Turret Tuner ... £18/5/-
Philips deflection and focusing assy. £6/4/6
Picture Tube sockets 5/3
Centring magnets 5/3
17in or 21in E.H.T. Assy. £23/17/6
Astor Turret Tuner ... £19/15/-
T.158 Frame output transformer 55/-
T.125 Line blocking transformer 14/3
T.126 P.P. Line transformer 25/-
T.110 filter choke 32/6
A.W.A. Rooter components for 17HP413 tube ... £13/6/-

COLLARO 4 speed record player £12/10/-

The world's best! COLLARO 3 SPEED TAPE DECK with 4 Hi Fi heads £52/19/6

HOME CONSTRUCTORS SPECIALS.

Jabel N2 planetary drives	16/6
Jabel dial scale assy. for N2 drive	30/
Zephyr front loading fuse holders	8/3
1-2-3 amp. fuses for pkts. of 5	3/7
Buron crystal set coils N1	9/-
Buron crystal set coils N2	9/3
Buron reinartz coil	12/9
Q plus WFC.1 10KC whistle filter	11/9
RCS 1¼in 6 pin plug-in coil formers	5/9
Q plus coil dope	3/8
Nylon dial cord 25 yards reel	12/6
Q plus single stage D/W bracket	105/
Q plus RF stage D/W bracket	193/
PN351 noise suppressors 2 X.1 mfd	15/3
BSR HF.8 motor only (230 V AC)	£5/5/-
B.J. Accel adaptor (for G.P.20 or 40)	22/4
B.J. Counter weight	31/3
A.2 ¼in grommets	3/6 per doz.
Telephone cords	13/7
Ormiston Hydrometers	11/-
Small pointer knobs	1/8
Large pointer knobs .. t..	2/5
Amphenol 4, 5, 6, 7, 8 pin plugs	2/8
Plug Covers	2/8
Teletron 4 pin miniature plugs	1/2
Teletron 4 pin miniature sockets	1/-
Scope AC/DC 6V, 6 seconds soldering iron	£2/10/-
Scope 230V transformer	49/7
1/8in, 5/32in, 3/16in spin tites	11/6
P.V.C. H-up wire (ass. colours)	7d per yd.
Single shielded H-up wire	2/1 per yd
Twin shielded H-up wire	3/3 per yd
Single shielded thin P-up wire	1/5 per yd
Tinned copper wire 16, 18, 20, 22, SW6 (1lb reels)	16/- per reel
18, 20, 22, 24, 26, 28, 30, 33, BLS enamelled wire 4oz reels	10/6
Multo-core solder	1/- per yard
Test probes flexible flex (Red or black)	2/5 per yard
T.V. aerial 300 ohm twin ribbon	1/1 per yard
Small alligator clip with screw	11d ea
200 ohm/2 ohm Line Transform. Brand new.	7/6
Zephyr 6in table mic. stand	16/10
M337 6 V/Non sync. vibrators	36/3
M338 12 V/Non sync. vibrators	36/3
Ducon plain potentiometer from 10K—2 meg	7/4
Ducon potentiometers W/switch (500K and 1 meg.)	11/10
Mullard Hi Fi book	5/9
L.B. magnetic head book	3/6
Philips air trimmers 3-30 pf	4/6
Jabel compression trimmers	1/3

Custom Built 5 WATT AUDIO AMPLIFIER, complete with 12in speakers £19/19/6

Call in and see our Mr. S. Hurrey. Let him solve your HI-FI problems for you! We are suppliers of LEAK, QUAD, WHARFDALE, ORTOFON, FERROGRAPH (etc., etc.) equipment.

Readers may remember that a few months ago I dealt with the fallacy that a picture tube could be burnt out by switching it on too soon after switching off. It was accompanied by a pseudo-scientific explanation about "... allowing time for the gas to settle back down the neck of the tube."

I was reminded of this a few days ago when I heard a somewhat similar story being related. This time, it was the effect that the picture tube could be burnt out by switching the set off at the mains rather than by the switch on the chassis.

Although one may be tempted, at first hearing, to write this off as another fairy story, and to ask what possible bearing the location of the mains switch could have on the life of the picture tube there is in fact an element of truth in it.

THE TRUTH

To be sure, it is a pretty gross exaggeration of the true story, but at least part of it is a true story to be exaggerated. It concerns the disconcerting tendency of some TV sets to produce a small but stationary spot in the centre of the picture tube for upward of a minute after the power has been switched off. If unchecked, this may eventually burn away the active material in the area concerned, resulting in a permanent black spot in the centre of the picture.

Now I am quite prepared to admit that this is a very undesirable state of affairs, and one which no one would willingly allow to happen to even the smallest CRO tube, much less an expensive picture tube. But it is not the truth as saying that the tube is burnt out, inferring that it has, presumably, been open-circuited filament.

In the latter case the tube is a complete write off, and the family cannot watch any kind of TV until a new one has been purchased, to the detriment of father's aircraft. The other effect would, at worst, be mildly irritating, and might even be completely overlooked in many cases.

In fact, one of our stations has been suffering such a black spot, slap in the middle of the frame, for many months past due to a defective tube in one of the film scanners. They have apologised for it and explained its presence on several occasions—but it's still there, and one seems to worry unduly about it, unlike most of the viewers.

FOR DEFECT

And if I'm any judge of the tolerance of the average TV viewer, there wouldn't be many prepared to throw away an otherwise perfectly good picture tube because of such a minor defect, unnoticeable and all though it may be.

In the circumstances, I think "damage" would be a better phrase than "burn out", while still serving to impress the viewer with the seriousness of the process.

Circuits designed to eliminate this defect are known rather colourfully as "spot swallowers." They have been used for many years in overseas designs, although it would appear that makers of most of the cheaper sets have been inclined to shrug the problem off as of little consequence

More recently, however, the production of picture tubes which require ion trap has called for greater attention to this problem. In the conventional bent gun tube the straightening of the electron beam by the ion trap magnet is a fairly critical business. The operating voltages, and in particular the EHT voltage, must be maintained within fairly close limits for correct operation with a given magnet position.

As the EHT falls the electron beam is no longer accurately aligned to pass through the small aperture in the gun and can be completely cut off in some cases with the EHT still as high as 70 per cent of normal.

However, in the case of the straight gun tube with no ion trap, the beam is naturally aligned to pass straight through the gun without obstruction. In these circumstances the spot will be maintained for a much longer period; until, in fact, the EHT voltage has fallen to only a small fraction of normal.

Nevertheless, allowing for this difference in degree, the following comments apply equally to both types of tube.

MAIN POINTS

Let us consider these points about a set which has just been switched off.

(1) The cathode of the picture tube is still hot and capable of emitting electrons.

(2) The final anode, or "Ultor," is still at approximately the EHT potential by reason of the energy stored in the filter capacitor. Further, there is no discharge path for this energy other than through the electron beam.

(3) The deflection system is no longer functioning, so that a relatively small value of beam intensity will still produce a bright spot on the screen.

These three conditions, the hot cathode, the charged final EHT capacitor, and the lack of deflection, are all that are necessary to produce the spot. The fact that the intermediate electrodes, and G2 in particular, are not energised may serve to reduce the intensity of the spot but not to eliminate it.

However, the behaviour of the potentials on both G1 (the intensity or control grid) and G2 (approximating the screen grid) immediately after switching off are of major importance in determining whether or not a spot will be formed.

If these two potentials both drop at the same rate when the power is switched off, the beam intensity will also fall, leaving the final anode with a substantial store of energy still to be dissipated (Note that, although the beam current falls, it is still sufficient to create a bright spot under conditions of no deflection.)

RAPID DISCHARGE

Most spot swallower circuits aim at discharging the energy in the final anode circuit as rapidly as possible after switching off. If the beam current can actually be increased at this time for a fraction of a second, the discharge will be virtually complete and no spot can be formed.

Conversely, anything which tends to reduce the beam current will only aggravate the position, and explains why the brightness control should not be turned down prior to switching off. Far from helping, it only worsens the condition.

In most circuits the bias on G1 is in the form of a positive voltage on the cathode and is derived from the main HT line. So also is the voltage for G2, so that the bias and G2 voltages will fall at the same rate when the set is switched off and no rapid discharge of the final anode is possible.

However, if we arrange matters so that (1) the bias is removed more rapidly than the G2 voltage or (2) the G2 voltage is maintained for a longer period than the bias, the beam current will momentarily increase as required.

In practice (1) is usually achieved by providing an "ON-OFF" switch with two sections, such as the normal double-pole type. One section is used to break the mains supply in the usual way, while the other disconnects the brightness control pot. from the HT line.

With this voltage removed the cathode

VACUUM MOUNTED CRYSTALS

for general communication frequencies in the range 3-14MC. Higher frequencies can be supplied.

THE FOLLOWING FISHING CRAFT FREQUENCIES ARE AVAILABLE IN F.T. 243 HOLDERS

6280, 4095, 4535, 2760, 2524

AMATEUR TYPE CRYSTALS 3.5 AND 7 MC BAND

Commercials—from £3/12/6 each, plus 12½% Sales Tax.
Amateur—from £3/-/- each, plus 12½% Sales Tax.
Regrinds £1/10/-

Crystals for Taxi and Bush Fire Sets also Available

We would be happy to advise and quote you as to the most suitable crystal for your particular application either in the pressure or vacuum type holder

New Zealand Representatives:—Messrs. Carrel & Carrel, Box 2102, Auckland

BRIGHT STAR RADIO

46 Eastgate St., Oakleigh, S.E.12, Vic. UM3387

FERGUSON

NEW RELEASES—NEW APPLICATIONS

Ferguson Transformers Pty. Ltd. have pleasure in announcing the release of new transformers and chokes and in advising the correct new and standard types for use in equipment recently described in Radio, Television & Hobbies

NEW R.T. & H. 17" OR 21" TV SET

POWER TRANSFORMER TYPE PF 1193*
(as used in earlier models)
PRIMARY—200, 220, 240V, 50 cps
H.T. SEC—295-0-295V, 275mA
L.T. SEC—6.3V Tapped 5V-3A, 6.3V-9A
*At a new reduced price

FILTER CHOKE TYPE F1-285
1 Henry, 275 mA, 48 ohms D.C.

R.T. & H. 35 WATT P.A. AMPLIFIER

POWER TRANSFORMER—PF 1335
PRIMARY—230, 240V, 50 cps
H.T. SEC.—305-0-305V, 180mA
L.T. SEC.—6.3V-4A C.T. 6.3V-4A 5V-3A

OUTPUT TRANSFORMER—OPM 12
NOMINAL POWER RATING—55 Watts
FREQ. RESPONSE—50-12,000 cps ± 2 db
PRIMARY IMP. PLATE-PLATE—3500 ohms
SEC. IMP.—500, 250, 125, 83, 62, 50 ohms
Also available as Type OPM 13
with Sec. Imp. 15, 12.5, 8, 3.7, 3.1, 2 ohms

NEW FILTER CHOKES

Listed below are new Filter Chokes recently released by FERGUSON, including Type F1-285, as used in the new R.T. & H. TV receiver.

F14-60	14H	60mA	550 ohms D.C.
F6-100	6H	100mA	210 ohms D.C
F12-100	12H	100mA	265 ohms D.C.
F1-285	1H	285mA	48 ohms D.C
F1-325	1H	325mA	27 ohms D.C

For details of the full FERGUSON range of Filter Chokes refer to our page in the May and June issues.

R.T. & H. TRANSISTOR TELEPHONE AMP

DRIVER TRANSFORMER TYPE MT 355
IMPEDANCE RATIO—1 TO 1
PRIM. D.C. RESISTANCE—275 ohms
SEC. D.C. RESISTANCE—325 ohms.

OUTPUT TRANSFORMER TYPE OP 370
POWER RATING—500mW
PRIMARY IMPEDANCE—300 ohms
SECONDARY IMPEDANCE—3.5 ohms

R.T. & H. 17 WATT P.A. AMPLIFIER

POWER TRANSFORMER—PF 130
PRIMARY—230, 240V, 50 cps
H.T SEC.—285-0-285V, 100mA
L.T SEC.—6.3V-2A C.T., 6.3V-2A, 5V-2A

OUTPUT TRANSFORMER—OPM7
NOMINAL POWER RATING—15 Watts
FREQ RESPONSE—50-12,000 cps ± 2 db
PRIM. IMP.—P.P.-10,000, 8,000, 7,000 ohms
SEC. IMP.—15, 12.5, 8, 3.7 3.1, 2 ohms
Also available as Type OPM8
with Sec. Imp.—500, 250, 166 125, 100 ohms

SAFETY ISOLATING TRANSFORMER

For added safety in Servicing transformerless TV and Radio Sets, and when using small portable appliances, FERGUSON have recently released a double wound 1 to 1 ratio Isolating Transformer

TYPE No. PF 1316—240v 50cps.
MAX. SEC. LOAD—200 VOLT-AMPS.

While nominally rated at 240V, it may be used on any supply voltage 200-260V, 50 cps. Ask your supplier for further details or write to us for full data sheet.

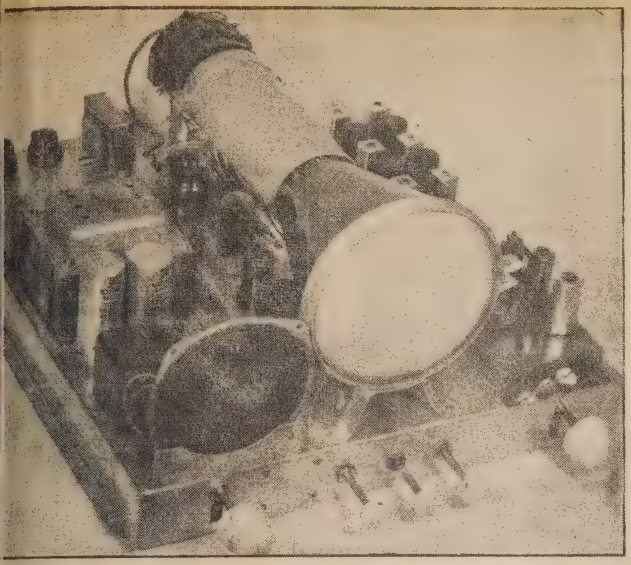
Individual data sheets on all of the above types available on request

Available from all leading suppliers throughout Australia

Manufactured by

FERGUSON TRANSFORMERS PTY. LTD.

FERGUSON LANE, CHATSWOOD, N.S.W. JA8491



'e is one of our standard TV chassis with a VCR97 tube mounted in position. 'te the small sub-chassis beneath the tube, carrying the deflection amplifiers, also 2.5KV EHT supply, where the line output cage will ultimately mount. The basic chassis has not been defaced in any way.

958 TV Set With A 6-in. Tube

'erhaps you are keen to build a modern 17 or 21-inch television receiver but cannot immedi-ıtely afford the picture tube and deflection components. Maybe you already have an ex-disposals CRO tube, which you would like to use with an otherwise standard chassis. This article should be just what you're waiting for.

by Neville Williams

may be wise right at the outset to .in the purpose of this present article ts relationship to earlier information ·ing the construction of both "dis-s type" receivers and the normal ınd 21-inch variety.

you may recall, the original articles sing disposals-type tubes and com-nts were aimed at getting sound and re for the smallest possible outlay. included the use of a home-made · and IF strip, even to home-wound oils.

ıdio amplifier, video amplifier, ı. separator, EHT supply, deflection lators and deflection amplifiers were levised to allow maximum use of ·us components.

r A NEED

; such, the information met a very ite need.

aturally enough the question has raised of converting such receivers se a modern 17- or 21-inch picture . The proposition is not a very ctive one, however.

echanically, the dimensions and lay-of the original chassis are anything suitable. It was designed for the cular job and the idea deliberately rejected of making it an untidy "universal" chassis.

In terms of circuitry, also, the entire electrostatic deflection system would have to be discarded and replaced by a magnetic system and EHT supply.

The output from the oscillators would have to be mated with the drive and linearity requirements of the deflection power amplifiers and, even assuming this could be done conveniently, the receiver would still be limited in ultimate performance by the non-automatic frequency controlled line oscillator.

Rather than attempt such a conversion, our advice has been to rebuild; to transfer tuner, IF amplifier, power supply and audio to a new and standard chassis, copying modern circuitry from there on and using any suitable substitute parts which happened to be on hand.

Appreciating this position, many other readers have inquired as to the practicability of the opposite approach; that is, to follow the basic circuitry as far as possible for, say, our 1958 Receiver, diverging at some point to accommodate temporarily a disposals CRO tube.

This proposition is quite logical, but it also has its difficulties.

NOT MANY ABOUT

Disposals tubes suitable for magnetic deflection, seemingly the obvious choice, are few and far between. Furthermore, their requirements in regard to focus, EHT and deflection are so different from normal TV picture tubes that a good deal of circuit manipulation would doubtless be required.

The disposals tubes which are available are designed for electrostatic deflection, and neither the waveforms nor the unbalanced "power" deflection circuits of the basic receiver are suitable for them. At the very least, the basic deflection waveforms would seemingly need to be modified and balanced push-pull voltage amplifiers added.

Rather intrigued by the whole idea, as much as anything on a personal basis, we set about to investigate it some weeks ago. It proved to be a highly practical proposition and the resulting set, pictured at the head of the article, has occupied a prominent position in the writer's den ever since. It has neatly solved the problem of how to work at night and watch television — without buying a second picture tube.

Before proceeding to a survey of the circuit a couple of questions naturally pose themselves. The first is obvious enough:

Is a 5in picture worth having? Isn't the result out of all proportion to the work involved?

From the experimenter's point of view, the answer is an emphatic "no."

OBVIOUS LIMITATIONS

It is quite true that the picture is green when it should more naturally be white. It is true that the brightness is limited and that focus errors occur when the contrast ratio is too great. This coupled with the small size, limits the value of the picture when the subject matter is small and the emphasis is on detail.

One therefore needs to be more fussy in terms of viewing distance, light level and focus BUT it is possible to become just as absorbed in the variety, the horse operas and the whodunnits, as with a normal picture tube.

Another obvious question has to do with the quality of available tubes. Are they good, bad or indifferent?

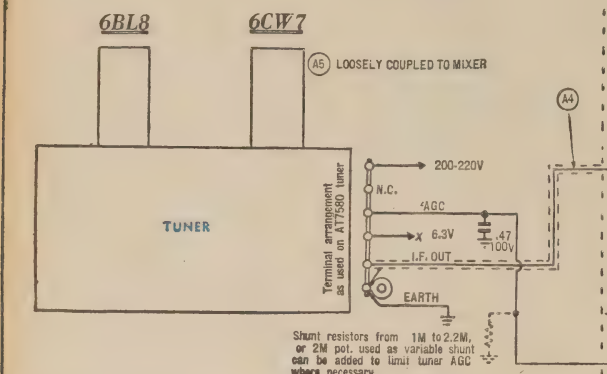
On this point, we can quote no sta-

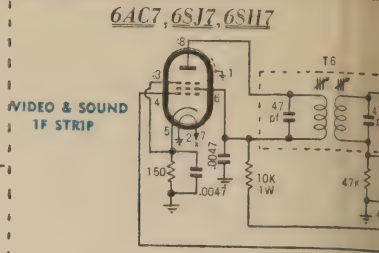
TV RECEIVER DESIGNED FOR A NORMAL PICTUR

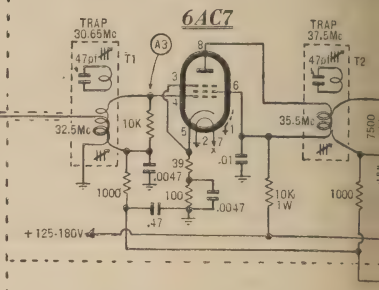
TUNER AND IF STRIP

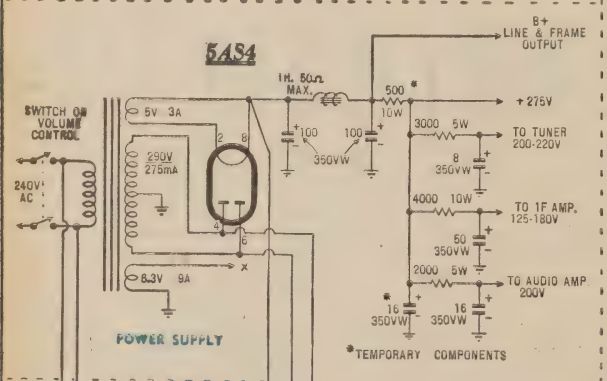
If desired, the commercial tuner shown below can be replaced by a home-constructed pentode tuner (see February, 1957, issue) or a home-constructed cascode tuner (see August, 1957, issue).

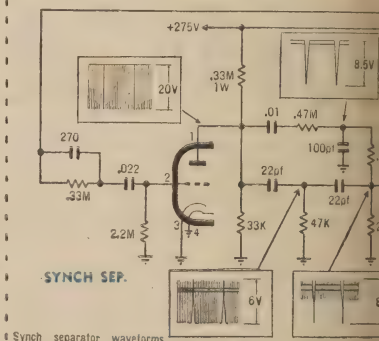
The I.F. strip shown is intended for home construction and was described in detail in the October, 1957, issue. It can be replaced, if desired, by the strip using miniature valves and commercial I.F. transformers (see August, 1957, issue). Alternatively, the Q-plus pre-fabricated and pre-aligned strips Mark II or Mark III may be used with extra AGC components added as per the May, 1958, issue.



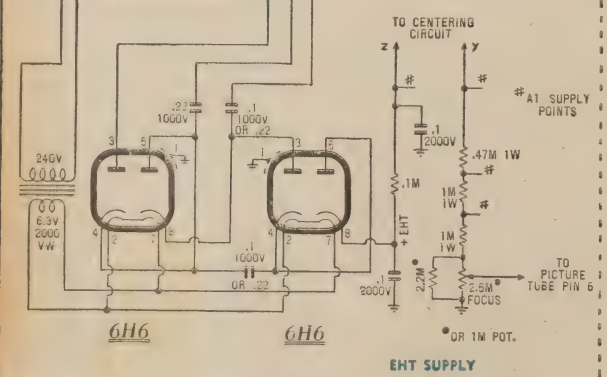








Synch separator waveforms viewed against 16 cps (approx.) time base.



DRAWN M W H

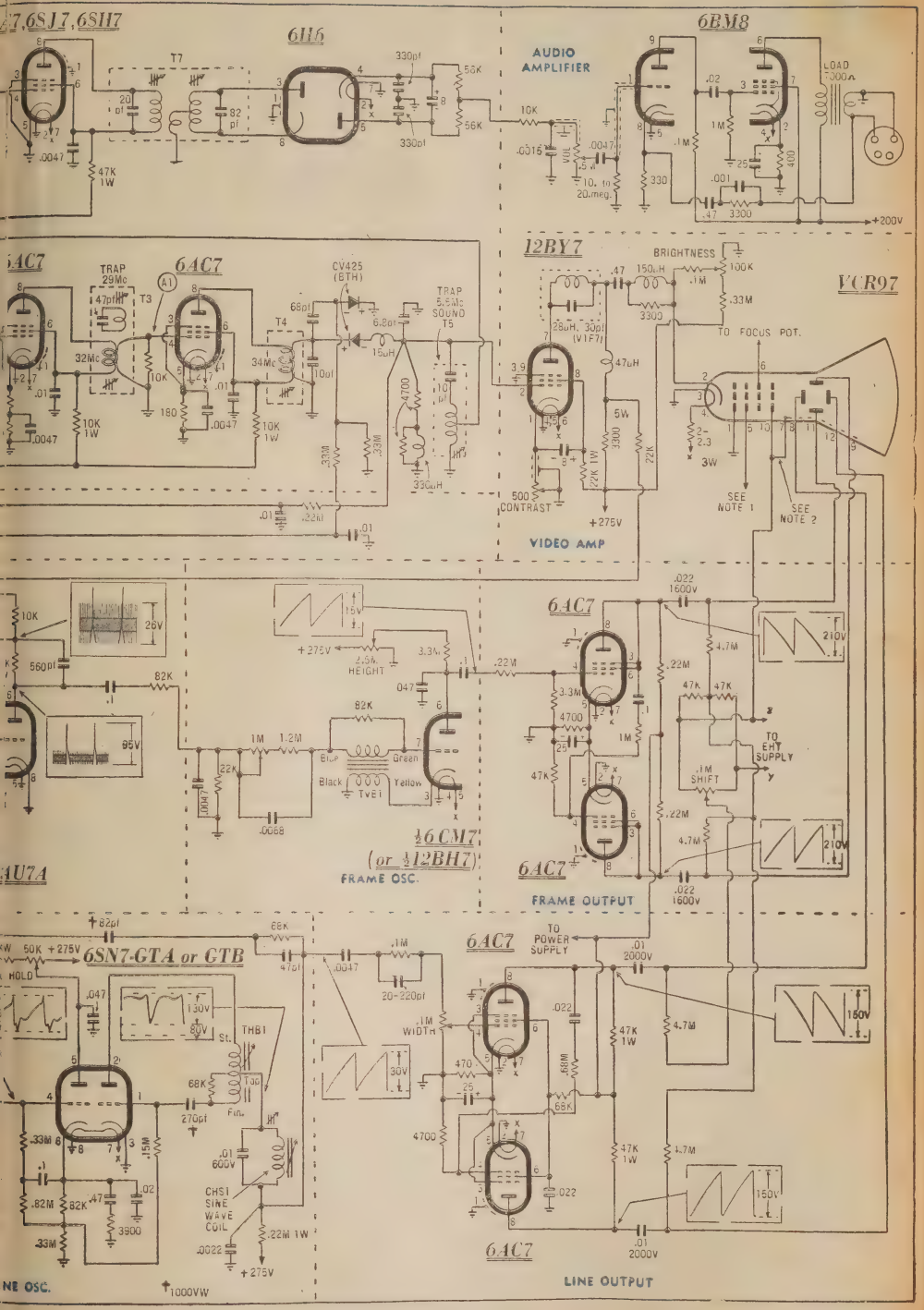
NOTES

1. If not already connected internally to A3, A1 can be returned as desired to 1000-2000 volt point.
2. In some tubes coating is connected internally to A3.
3. All capacitor values are shown in microfarads, unless otherwise marked.
4. All resistors are half-watt unless otherwise marked.
5. Voltages are as measured in prototype chassis, using standard tolerance not design centre components.
6. All resistor values are shown in ohms unless otherwise marked. (M = Meg. K = x1000).

1958 TELEVISION RECEIVER

(Adapted for temporary use with disposals CRO tubes)

UBE ADAPTED FOR TEMPORARY USE WITH A VCR97



VALUE! and superiority!

CHANNEL MASTER

the world's largest range of TV Aerials and accessories!

FIRST IN PREASSEMBLED AERIALS

CHANNEL MASTER — supplies everything but the roof

Australia's Nationally Advertised Aerials

CITY VEE
Model 315R.7.

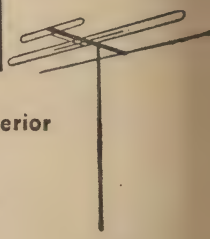
This low priced aerial is proving tremendously popular. It gives excellent results in metropolitan areas covering Channel 1 through 10. People like it because it looks attractive and modern. £6/13/-.

MODEL 310
DUAL FLECTOR

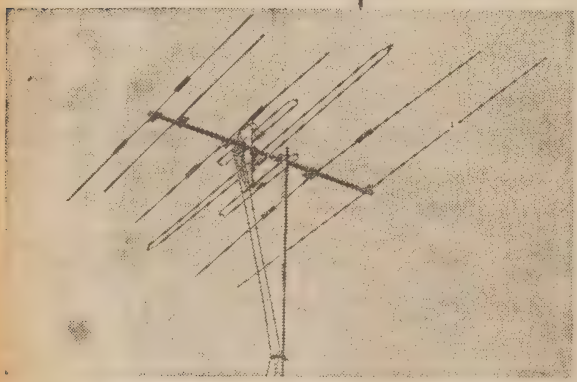
Ideal for strong to medium signal areas. Makes an excellent loft aerial. Covers Channels 1 through 10.

"MAVERICK" SERIES
MOST POPULAR
AERIALS IN AUSTRALIA

RETAIL £7/17/6



- Low price ● Mechanically superior
- Fully pre-Assembled
- 5 models—for every location.

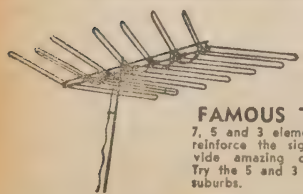


THE RAINBOW MODEL 330

The genuine all-channel yagi, that is so popular in Australia and the American Continent. Full band width and highest gain. Like a forest over roofs in N.S.W. and Victorian Country.

MODELS 1022-1007-Z
MATCH YAGIS

Big, sensitive and best performers of all the long yagis. Easy to assemble — gain tremendously in stacking. Channel Master's BIG 10 has the most gain of all TV Aerials.



FAMOUS TW

7, 5 and 3 elements TW's reinforce the signal, provide amazing directivity. Try the 5 and 3 for outer suburbs.

Available from selected wholesalers!

FREE! 16 page booklet "Better Pictures on your TV Set!" Post Free.

Simply send this coupon to Channel Master

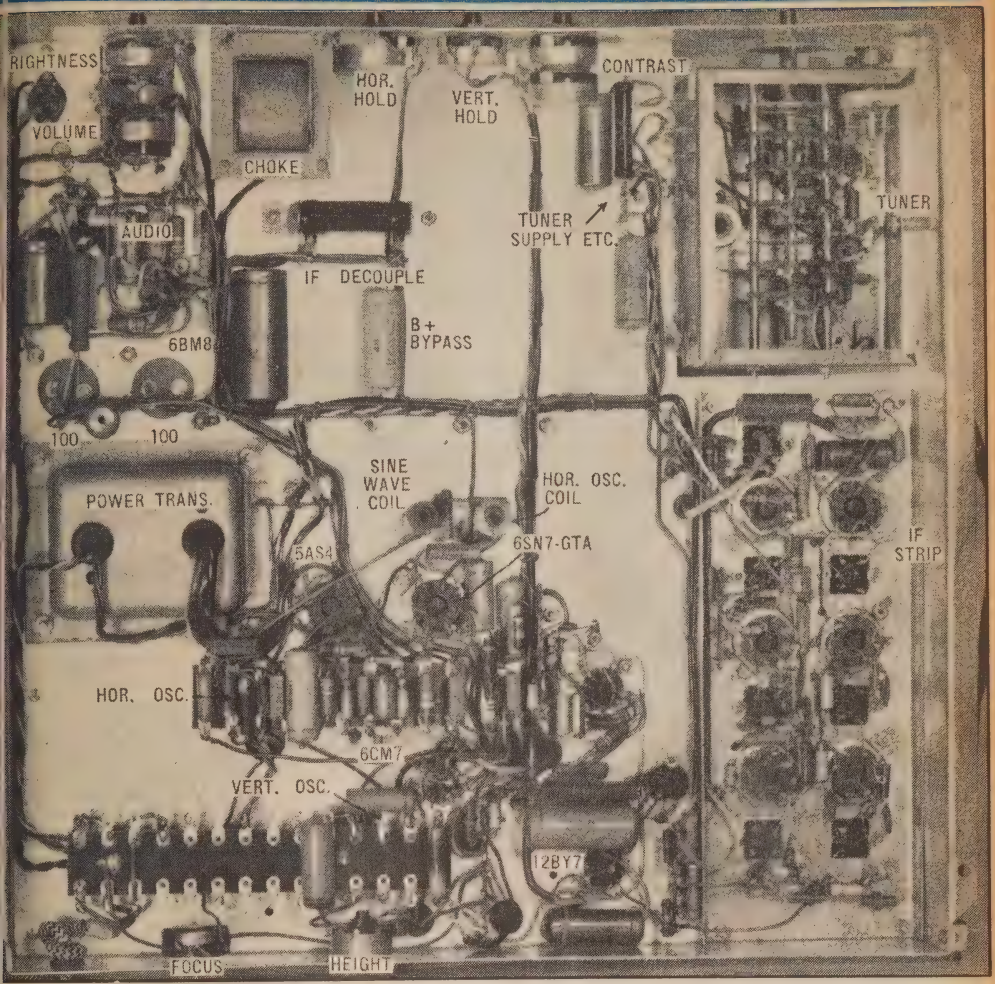
NAME _____

ADDRESS _____

RH658

FACTORY: CHANNEL MASTER PTY. LTD., 752 PITTWATER ROAD, BROOKVALE, N.S.W. XF022

NDER-CHASSIS VIEW OF ADAPTED TV RECEIVER



art from the deliberate use of a home-built tuner and IF strip, the underchassis wiring is virtually identical with our recently scribed 17-21 inch "1958 TV Receiver." The frame output wiring is missing, of course, but the panel which will ultimately carry the components is in position near the rear edge of the chassis

s but we do know that a large num- of disposals tubes have developed ts, probably by reason of their age the pressure under which they were inally manufactured.

'e would suggest, therefore, that any you propose to use should be tested rehand or bought on a replacement- ulty basis. We may have more to later about tube types and their

ow for a survey of the circuit dia- n.

he tuner can be of your own choos- without affecting the remainder of receiver.

his point is emphasised by the fact the diagram shows the commercial r originally specified for our "1958 Receiver," whereas the one actually d in the chassis, as photographed, is the original home-made pentode tuner described back in February, 1957. (For cascode version, see August, 1957.)

Though not recommended for weak signal areas, these home-made tuners are quite practical for most locations The same remark would probably apply, in general, to other simple home-made tuners, assuming a reasonably efficient aerial.

The IF strip can likewise be the subject of individual choice, depending on preference and price. We suggest you refer back to our remarks on the subject in the May issue relating to the 1958 Receiver.

Since the object in this present project is to minimise cost, we have assumed the use of a home-constructed strip using 6AC7 valves. References to the use of such a strip will be found December, 1956, September, October and November, 1957, the October issue containing detailed constructional and alignment information. (Back copies are still available at the time of writing.)

Full information was given for hand-winding the coils and blank formers and cans have been available for those who needed them. Alternatively, IF transformers wound to the original specifications have been released in at least two brands and the strip pictured actually ses a set of such components.

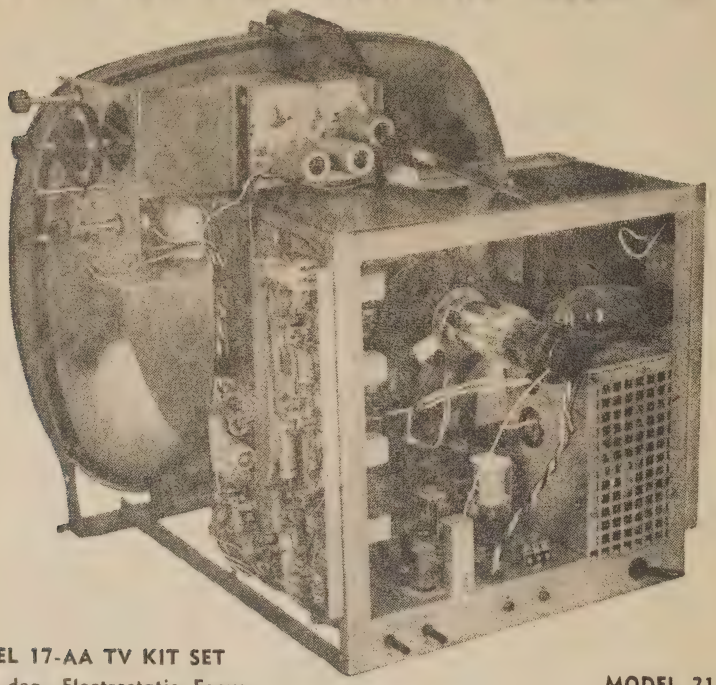
As is only to be expected, performance of the 6AC7 strip is slightly down on commercial 4-stage IF strips but is similar to other types using three video stages. Once again, it is adequate for average receiving locations.

You will note that we have added a separate AGC diode, in line with our

IF YOU HAVE

BUILT A RADIO OR AN AMPLIFIER SUCCESSFU LLY THEN YOU CAN MAKE A SUCCESS OF T

Q-Plus T-V Kit Sets—Now Two Models to choose fro



"Q-PLUS"

MODEL 17-AA TV KIT SET

17" 90 deg. Electrostatic Focus Picture Tube

- ☆ Complete 18 page, construction manual with fully detailed photographs and step by step instructions.
- ☆ Q-Plus super-cascode high gain turret tuner, fully tested and aligned—Australia's most sensitive tuner ideal in fringe areas.
- ☆ Unique construction permits easy section by section construction. Twenty valves in all.
- ☆ Q-Plus 4 stage high gain Video and sound I.F. strip, fully wired, tested, aligned.

Fully inclusive price without Cabinet includes every part and Sales Tax, to make A 17" TV Chassis £119/19/-

ILLUSTRATED ABOVE—THE NEW MODEL 21 AA

Q-PLUS TV KIT-SET

MODEL 21-AA TV KIT SET

21" 90 deg. Electrostatic Foc Picture tube similar electrically the 17-AA but with suitable mour ings for the 21" Picture Tube

- ☆ "Syncroguide" line A.F.C. oscillat signal will remain in sync even unc the most adverse signal conditio The very set for fringe areas.
- ☆ All the necessary controls group together at the side.
- ☆ Unit chassis lends itself to ma modifications to suit the cust builder.
- ☆ Ample deflection and E.H.T. reser for all 90 deg. picture tubes up to 21
- ☆ Will convert to 110 deg. deflecti when suitable picture tubes becor available.

Fully inclusive price without Cabinet i cludes every part and Sales Tax, to make a 21" TV Chassis £129/19/

Send 11/6 for 18 Page Instruction Manual now. This amount will be refunded to you if you purchase a Kit.

Q PLUS KITS ARE AVAILABLE NOW FROM ALL RADIO, T.V. DEALERS SPECIALISING IN KI OR FROM THE MANUFACTURERS, WHO HAVE A SPECIAL QUERY SERVICE FOR ALL BUYER

Demonstration Kits may be seen in operation at these Addresses:-

R. W. STEANE & Co. Pty. Ltd. SYDNEY: 8 Cadow St., Pymble. JX3556
MELBOURNE: 2A Montrose St., Auburn. WB3377-8

mendations for the standard 1958
er. This works very well and
ntially obviates overload problems.
: other point concerns the sound
nplifier. We have shown 6AC7,
and 6SJ7 valves as possible alter-
s, as in the original circuit. All
work, but the alignment of the
section is more logical with the
gain types, the 6AC7s tending to
rather too much gain.
h audio and video signals are
ble directly from the output of
F strip.

ER POSSIBILITIES

ough we have retained in the circuit
normal audio amplifier, using a
6BM8, equivalent results could be
ied from any conventional audio
using separate valves. With a little
ngement, there is room to punch
socket holes and mount a couple
tal or "loktal" valves, without de-
g from the appearance or per-
nce of the receiver.

so doing, and using disposals
also in the IF strip, quite worth-
savings can be made in overall

r normal gain and sensitivity the
amplifier needs to be a high trans-
ictance pentode and we would sug-
using the specified type. An ordin-
niniature output pentode could be
as a temporary measure, with some
f video gain. We would not sug-
using an octal or loktal type, how-
because it would involve punching
ge hole, which would later need
disguised.

u will note that the video amplifier
wn with a 5.5 Mc trap in the plate
it and other details mentioned in
ast issue. We now regard this as
preferred arrangement.

point of fact, it is highly doubtful
her the effect of the 5.5 Mc trap or
peaking chokes would be apparent
small screen, though both are im-
nt with a regular picture tube. A
temporary economy could there-
be achieved by wiring the video
ifier as if the trap and peaking coils
to be included, but bridging across
positions with a scrap of wire.

e peaking chokes are not neces-
optimum for use with a VCR97,
milar tubes, which appear to have
higher cathode input capacitance
regular picture tubes.

ICH. SEPARATOR

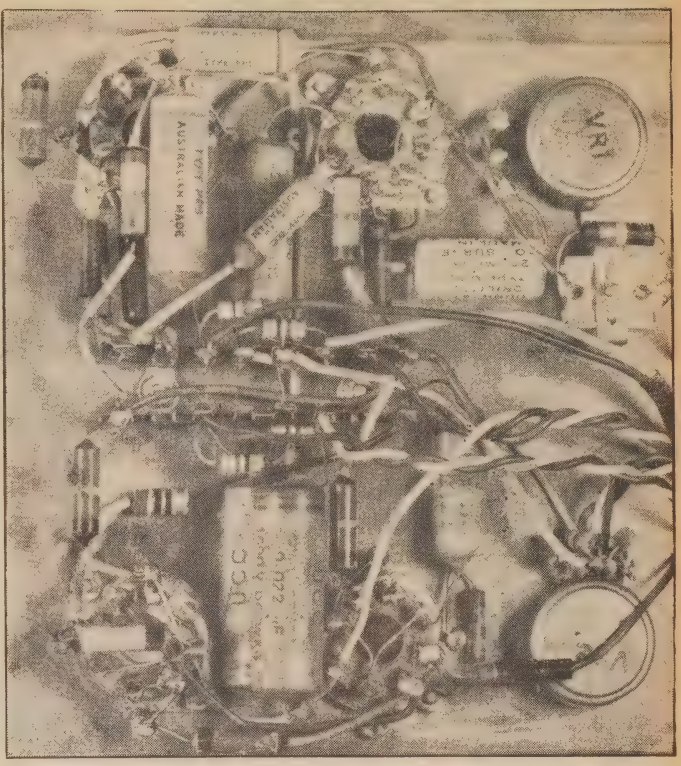
r the synch. separator a 12AU7 is
nmended, but, to judge by the
icteristics, a 6SN7-GT could be
ituted if you happen to have a good
on hand. No changes should be
ssary in the circuit and performance
ld be identical.

n ordinary 6SN7-GT can be used
for the line oscillator, instead of
"GTA" or "GTB" specified, pro-
d it is in good condition and not
edly microphonic.

he circuitry around this stage is al-
identical with our 1958 receiver,
main point of difference being in the
ooth output components. These have
modified to give a sawtooth wave-
of lower amplitude but improved
e, more suited to the deflection vol-
amplifiers.

he capacitor is now .002mfd, which
well be made up from the two .001
citors you will ultimately need in
part of the circuit, while the resistor

UNDERNEATH VIEW OF SUB-CHASSIS



Here is the wiring of the temporary sub-chassis carrying the 6AC7 deflection amplifiers. Width pot. and linearity trimmer are at the top right, with line stages adjacent. Leads, running away to the rear of the main chassis, terminate for the most part on the tagstrips near the centre of the picture.

is increased from 68K to 0.22 megohm.

Reduction in the output sawtooth amplitude means a reduction in the reference pulse fed back to the line frequency control tube. This has been offset by reducing the feedback resistor and increasing its bypass more or less in proportion.

The lock-in range is a little less than in the original 1958 receiver, though it is still adequate. Furthermore, being an AFC system, individual lines are not initiated by noise pulses, as with individual triggering.

STILL NOT IDEAL

Even allowing for the aforementioned changes, the line sawtooth waveform is not ideal, showing slight residual curvature and also a definite rounding of one corner. Both effects are largely offset by an adjustable high frequency boost circuit at the input of the line amplifier stage.

This simply involves a 0.1 meg. resistor shunted by a 20-220pF trimmer —actually the line drive adjustment trimmer which you will need later in the EHT cage. In practice, increasing the value of the trimmer extends the left-hand side of the image, allowing it to be adjusted for near-perfect linearity.

The frame oscillator stage likewise follows the 1958 circuit, except that the wiring to the ultimate "Linearity" control is rearranged slightly to allow it to function for the time being as a height control.

The natural linearity of the frame oscillator is of such an order that no special adjustment is necessary. It is affected to a small extent by the bias and balance of the amplifier valves but the constants shown should be fairly close to optimum.

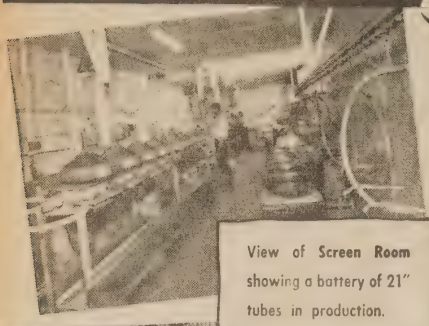
Push-pull voltage amplifiers for both line and frame are mounted on a separate sub-chassis, which attaches to the main chassis below the picture tube. It can be wired as a separate unit and connected by flying leads, thus avoiding any permanent disfigurement to the main chassis. We shall have more to say later about its construction.

DISPOSALS VALVES

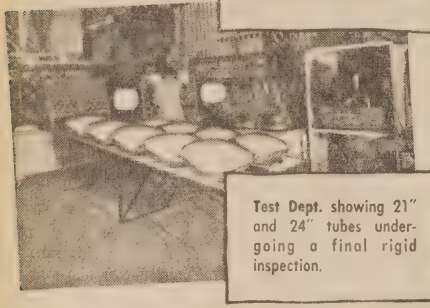
For the deflection amplifiers, we chose 6AC7 valves, because they are among the cheapest and most plentiful available from disposals sources. During the course of our experiments, we wired them as triodes and as pentodes and with different phase changing arrangements, the method shown being the one we recommend.

The line deflection amplifiers are wired

Your Eyes — will make you Screenwise



View of **Screen Room** showing a battery of 21" tubes in production.



Test Dept. showing 21" and 24" tubes undergoing a final rigid inspection.

'Thomas' Quality Control *makes the vital difference* in TV Picture Tube manufacture . . .

It's the kind of difference which can literally be **seen** on the **screen** and pays big dividends with long-lasting, true-to-life picture reproduction.

Whether you order five or five thousand Thomas Tubes, you are certain of only the highest-quality production control because every step in the making of a Thomas Picture Tube is the result of careful planning, rigid supervision plus the vast engineering "know how" of our overseas associates who have manufactured over eight million tubes.

You'll have no difficulty in seeing a Thomas Picture Tube for yourself—**they're in all good sets—EVERYWHERE.**

Thomas PICTURE TV **Tubes**

Quality Products of Thomas Electronics of Australia Pty. Limited

THOMAS TUBES FOR TOP TV — ALWAYS

ıtodes, largely to minimise input
ıance and allow the input grid to
l via the linearising network al-
referred to and a simple 0.1 meg
iometer, as a width control.
e load values are low enough to
ve frequency response, while the
ıg capacitors are adequate for the
sawtooth waveform which the stage
handle.
ıponents supplying the grid signal
e second valve should ensure a
ably balanced output from both
though exact balance is not es-
for good linearity. Checks on
e can only be carried out ac-
ly with a CRO probe having very
input impedance. Tests which
alter picture size when the CRO
ched to either plate are obviously
l.

T SENSITIVE PLATES

intention of the circuit is that
ne amplifiers should drive the de-
plates nearer the CRO tube gun
therefore having the greater de-
n sensitivity. This is logical, be-
the line amplifiers have to operate
higher frequency, into a lower
load and produce the larger of
vo picture dimensions.

the frame amplifier, we found
best results were to be had with
AC7 valves connected as triodes.
ngle general-purpose twin triode
l probably do equally well, but
6AC7's are still cheaper.

ice input and shunt capacitance is
reat problem at frame frequency,
plate loads can be quite high and
assists the valves in producing
gh output voltage to swing the less
ive plates. However, the very low
ency components inherent in a
cle sawtooth dictate that the coup-
capacitors should be relatively high
lue and preferably not lower than
values specified.

ice the coupling capacitors for
line and frame have to feed de-
r plates at better than 2KV, a
voltage rating is essential. In our
nal chassis, the line coupling capa-
s are of 2,000 volt rating but we
a risk with 1,600 volt types in
frame circuit, where larger values
called for.

/ARE LEAKAGE

ıe effects of a capacitor breakdown
not very serious. The thing which
to be watched is residual leakage
characteristic which largely rules
the use of old or wartime capa-
s.
hen associated with a 5-meg. re-
r, a leaky coupling capacitor can
y a quite significant DC potential
ıe relevant deflector plate, causing
ly displacement of the picture. With
or more leaky capacitors, each sub-
to temperature and humidity effects.
ic wandering of the picture posi-
can be most disturbing.

our own receiver, we found that
centring pot. was adequate, giving
ed control over picture position in
horizontal plane. It can correct any
t misalignment of the gun, any
r in position due to waveform and
effect of the earth's magnetic field.
necessary, an additional potentio-
er could be provided for the frame
nit and/or the values increased to
added control over picture position.
he current drain of the deflection
amplifiers is only a few milliamps, against 150 odd milliamps for a full-scale magnetic system. As a result, the total drain of the set in its present form is less than half the ultimate figure of 275 milliamps, and the HT voltage is well above the intended figure.

This is all to the good as far as the deflection amplifiers are concerned but it is an embarrassment in other sections of the receiver. Rather than make wholesale adjustments to dropping resistors, etc., we simply suggest the temporary inclusion of another section in the filter as shown, involving a 500 ohm heavy-duty resistor and a 16mfd. electrolytic.

In point of fact, the resistor can be any old resistor or filter choke of the right order and capable of carrying the current (100-125 mA.), while the 16mfd. electrolytic can well be the 600-volt unit you will need later for the B-plus boost bypass.

With this rearrangement, the power supply delivers around about 325 volts to the deflection amplifiers and about 275 to the remainder of the circuitry. We therefore show the same typical reference voltages as in the original 1958 receiver.

So much for the basic circuit. Now for a word about the VCR97 tubes themselves.

Following publication of the original article, we received a good deal of correspondence suggesting errors in pin numbers, different connections, different data, etc. and, from it, we were able to piece together a fairly complete story about these tubes.

PURPOSE OF NUMBERS

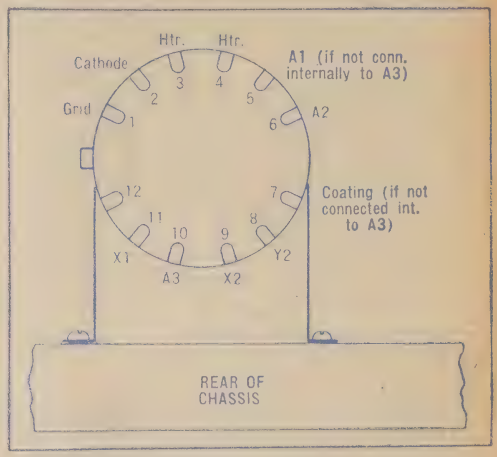
First of all, the numbers given in our original article were for the purpose of identifying connections in a circuit originally arranged for a 5BP1. They were not intended as official pin numbers and this much was stated in the article. The official pin numbers and their significance are as shown on the drawing herewith.

There are several varieties of VCR97 but following, apparently, two main patterns.

One basic pattern, on which our original data was based, is represented by the commercial type ECR60. This has its number 1 anode and the internal graphite coating connected internally to the number 3 anode, on pin 10. Pins 5 and 7 are blank.

Maximum rating on this particular version is 2,500 volts for A1, A3 and coating.

Tubes made to this general pattern can be distinguished by the blank base pins, evident when the base cover plate is removed. The deflector plates, also, are flat sheets of metal supported on a fairly light network of wires and spacing micas.



Here are the recognised pin numbers and base connections for the VCR97 tube. If mounted in the position shown relative to the chassis and wired as per our main circuit diagram, the picture should be the right way up and the right way round.

Our tests have shown that many of these tubes have restricted deflection angles, such that any attempt to deflect the spot over the whole screen width, in one or either direction results in the beam striking the deflector plate and therefore reaching a limit on the screen beyond which it will not go.

The restriction has been found in what appear to be different varieties of the ECR60 but its degree also varies in tubes which would appear to have been from the same batch. A good deal of luck is involved, therefore, as to the actual size of the picture which a given tube of this type will produce.

ALTERNATIVE CONNECTIONS

We would suggest trying the tube first with the connections shown in our circuit. If the picture size is unduly restricted, try rotating the tube on its mount by 90 degrees and interchanging the functions of the X and Y plates. This will involve the line amplifier in driving the less sensitive plates but it may just allow a bigger picture to be obtained before line amplifier overload is encountered.

The second major class of VCR97 is apparently patterned on the GEC E-4504-B-16. Heater current is 1.1 amp against 1.0 amp for the ECR60.

Its first anode is brought out separately to pin 5 and its coating to pin 7 though, just to confuse matters, we have seen and heard of examples of this tube with an internal A1 connection, but separate coating connection.

Physically, however, it is normally distinguished by having a connection to all base pins, while the deflector plates are highly polished and formed into shallow dishes. The supporting structure is more robust in appearance and certain leads are insulated by glass tubes.

This version of the VCR97 has a

Did you know

that the SPACE SAVING Microcap range extends from the smallest right up to 2 uF capacitance?

A.E.E. TYPE W99

MINIATURE METALLISED PAPER CAPACITORS are available in working voltages of 200, 400, 600 Volts D.C. and 300 Volts A.C. in values up to .04 uF. They have a "self-healing" feature which allows the capacitor to withstand accidental over-voltage. Type W99 are capable of operation in temperatures of up to 85°C. (185°F.)

A.E.E. TYPE W48

MINIATURE METALLISED PAPER CAPACITORS cover the range .05 uF to 2.0 uF in working voltages of 200, 300 and 400 Volts D.C. They also feature the valuable "self-healing" property, and 85°C. operation.

Type W48 provide higher capacitances in a smaller size; hence more efficient filtering for the available space.

Wide range covers requirements of modern design.

M11.

Microcap CAPACITORS

*Registered Trade Mark

Manufactured under licence from A. H. Hunt (Capacitors) Ltd., London, by

AUSTRALASIAN ENGINEERING EQUIPMENT CO. PTY. LTD.
476 LATROBE STREET, MELBOURNE. FY 2638
N.S.W. Agents:
Wm. J. McLELLAN & Co. Pty. Ltd., 124 Sussex St., Sydney. BX 1131

num rating of 5,000 volts on A3
,500 volts only on A1.
practice, many of the tubes work
with 2,000 to 2,500 volts on all
voltage electrodes but, in others,
ut-off bias is so extended that it is
convenient to tap A1 down the
supply to nearer 1,000 volts.
r experience suggests that these
are more consistent in their de-
n angles than the ECR60 variety
are therefore to be preferred, all
things being equal.
er and above the foregoing differ-
, strange things seem to happen to
tubes put back into service after
se of many years.

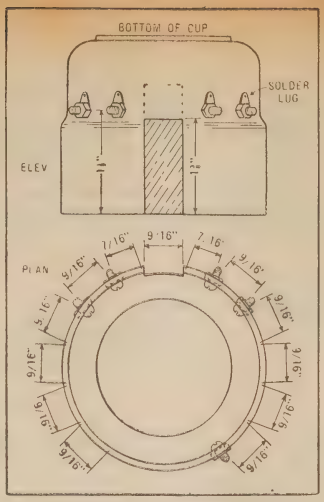
SSION, SCREEN?

some the natural brightness is
and any attempt to increase it or
adequate modulation results in a
ive picture. This might indicate
mission or impaired screen activity
oth, the former assumption being
gthened in some cases by the fact
operating the heater at a little
e 4.0 volts appears to improve
rs considerably.
her tubes showed hopeless inter-
n between brightness and focus,
ng it impossible to get even il-
nation over the screen area with the
anywhere near optimum. These
and other which appeared to be
nically misaligned were virtual
e-offs."
en many of what later proved to
ood tubes showed initial scanning
liarities which tended to clean up
a period of operation. Typical
s were gaps in the raster adjacent
eflector plates or a tendency for
picture to concentrate around the
of the flare until the set was
hed off and on again, or the glass
rubbed over with a piece of cloth.
ne presence of a metal strap around
periphery of the glass has an effect
being for the better in most cases.
e correspondents have said that a
round the face connected to the
has been found beneficial.

most cases, these peculiarities seem
isappear after the tubes have been
ervice for a few hours but it is
ntial to mention them so that tubes
not be rejected unnecessarily.
ckets for the VCR97 are scarce and
nsive and it may be necessary
r to improvise one or solder direct-
o the base contacts. One suggestion
at a socket be made from a plastic

KING A SOCKET

he idea was illustrated in a "Reader
t It" item in the July, 1956 issue,
the illustration is reproduced on
page. The instructions given at the
read as follows:
Saw out the handle, leaving a slot
in wide and 1-3/8in long. Drill a
s of 1/8in holes around the cup,
first 7/16in from the handle slot
then 9/16in between each subse-
nt hole, drilling six holes on each
of the handle slot. Each hole is
from the top of the cup.
Insert in each hole a 1/8in round
d screw ¼in long, the head inside
cup. Then fix a solder tag in the
w outside the cup and lock it with
/8in nut.
The handle slot can be extended
ther ¼in, making 1-7/8in in all to



From a reader in Victoria comes this suggestion for making a socket for a VCR97 or similar tubes from a plastic drinking cup.

take the whole of the key ridge on the side of the tube base. Alternatively, ¼in can be sawed off the key ridge to allow the cup to fit over the tube base without further weakening the cup."

In the prototype receiver, the tube was supported by brackets and clamps, the centre line of the tube being about 5in above the top of the chassis.

In this position it was subject to some residual hum field from the power transformer, even though this last is a shielded type. Hum deflection of the beam produces a slow ripple in the picture drifting one way or the other, depending on the exact frequency of the power mains, relative to the frame frequency.

MAGNETIC SHIELD

Practically all hum trouble was eliminated by having a plumber roll two scraps of ordinary 16 gauge mild steel into half-shells which slipped over the neck of the tube and overlapped at the joints by about ¼in.

Here another one of those deflection peculiarities emerged. We found it best not to let the metal rest against the glass at the flare end, otherwise it tended to displace the picture. A ring of ordinary plastic sleeving between metal and glass eliminated all sign of the effect.

Actually, the influence of hum fields on the tube is a good deal less with the tube further away from the power transformer and there is therefore some advantage in mounting it a little higher up and nearer the tuner and IF strip.

As we have already explained, the construction and wiring of the main chassis follows closely on the 1958 receiver and the detailed photographs and drawings can be followed in so far as they apply. The obvious thing is to refer back to the preceding three issues and, in fact, to keep them by against the day when they will be needed to transform the present set into its full-sized 17 or 21in counterpart.

Apart from the CRO tube and its mounting, two other items have to be made up, namely the EHT supply and the sub-chassis carrying the deflection amplifiers.

We built up the EHT supply on a simple dish chassis, bent from scrap aluminium and measuring 6 x 5 x 1 inches. (It could afford to be nearer 2in deep.) This is supported on four long bolts in the position originally intended for the line output cage.

On top of the chassis are two 6H6 valves and a 6.3 volt filament transformer, which should ideally have a high insulation rating between secondary and elsewhere.

As we have explained on other occasions, operation of the 6H6s as EHT voltage doublers is way outside their normal ratings but American and Canadian types, at least, stand up to it very well. In any case, an odd failure of a two or three-shilling valve is not a tragedy.

Beneath the chassis, the layout is not critical, apart from the obvious need to avoid possible flashover paths. We simply attached the relevant capacitors and resistors to a length of terminal panel underneath, running leads hither and yon as necessary.

CONNECTING LEADS

Leads connecting the units to the mains, etc., pass down through an existing hole in the chassis, being folded over and left long enough to allow the EHT unit to be turned over and checked while in operation.

An idea of the order of EHT voltage can be obtained by connecting a total of 10 megohms resistance in series with the 1 milliamp scale of a multimeter, thus transforming it into a 10,000 volt meter and loading the EHT supply by not more than 250 microamps.

As indicated on the circuit, the EHT divider circuit has to be run to the deflection amplifier chassis and back again to include the shift potentiometer (or potentiometers).

A good deal more care is needed in planning the layout of the deflection amplifier chassis. This, too, was bent up from aluminium scrap, measuring 6½ x 6 x 1 inches with narrow flanges each side to facilitate attachment to the main chassis.

(Continued on Page 127)

AWA
RONETTE
MICROPHONES & ACCESSORIES

Type R474
£28/9/10
Studio type, cell, omnidirectional.
Technical pamphlets will be mailed on request.
NICHOLSONS LTD.
BARRACK ST., PERTH
and leading wholesalers.

HI-FI's vital "4"

1. Pickup **2. Turntable** **3. Amplifier** **4. Loudspeaker**

Every Record Player has these 4 sections, of course.—

BUT: For true High Fidelity the Highest Possible Standard of EACH section is vital!

Combinations of the following world-renowned products assure you of faithful reproduction from each unit!

1. Pickup:

LEAK ★ ORTOFON

Moving Coil Pickups with Interchangeable Heads to suit every application.

2. Turntable:

ORPHEUS

A reliable Transcription Turntable with "wow" and "flutter" figures matching the rigid specifications of modern recording techniques.

3. Amplifier:

LEAK ★ GRAMPIAN

With "Point One" or
rislope III Pre-Amplifiers

5/10 with High Sensitivity
Type 56 Pre-Amplifier

4. Loudspeaker:

WHARFEDALE

Complete Range

GRAMPIAN ★ LEAK

High Fidelity Model
1255/15

12in. & 16in. "DUAD"
Dual Concentric

All these vital parts in the Hi-Fi Chain are available from discriminating Dealers throughout the Commonwealth. In Hi-Fi Departments are enthusiastic men with experience to help you choose the combination best suited to your individual requirements. They will discuss your problem, arrange demonstrations and provide literature with detailed specifications.

MELBOURNE:
Radio Parts Pty. Ltd., 562 Spencer Street.
Homecrafts Pty. Ltd., 290 Lonsdale Street.
Warburton Franki (Melbourne) Ltd., 355 Lonsdale Street.
J. H. Magrath and Co. Pty. Ltd., 208 Little Lonsdale Street.
William Willis and Co. Pty. Ltd., 428 Bourke Street.

BRISBANE:
Chandlers Pty. Ltd., cnr. Albert and Charlotte Streets.
Trackson Bros. Pty. Ltd., 157-159 Elizabeth Street.
A. E. Harrold Pty. Ltd., 123-125 Charlotte Street.

SYDNEY:
Audio Engineers Pty. Ltd. (N.S.W. Distributors to the trade), 422-424 Kent St.
United Radio Distributors, 175 Philip St.
Modular Electronics 579 Sydney Road Seaforth.
Magnetic Sound Industries, 387 George St.

ADELAIDE:
Gerard and Goodman Ltd., 192 Rundle Street.
Newton McLaren Ltd., 17 Leigh Street
L. S. Wise Ltd., 196 Gilles Street.
Limbert Radio Co., 16 Charles Street.
Sound and Television Engineers, 233 Rundle Street.

PERTH:
Atkins (W.A.) Ltd., 894 Hay Street.
Leroya Industries Pty. Ltd., 672 Hay St.
Electronic Industries Imports Ltd., 68 Railway Parade.

TASMANIA: HOBART:
Homecrafts (Tas.) Pty. Ltd., 220 Elizabeth Street.
The Sound Centre, Bank Arcade.
Watson's Wireless, Collins Street.
Crosby Walch, Elizabeth Street.

LAUNCESTON:
K. W. McCulloch (Distributor to the Trade in Tasmania), 94 Cameron Street.
Homecrafts (Tas.) Pty. Ltd., 120 Charles Street.
Don Phillips Radio Brisbane Street.

NATIONAL DISTRIBUTORS FOR AUSTRALIA

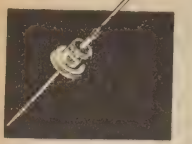
Simon Gray Pty. Ltd.

28 ELIZABETH STREET, MELBOURNE, C.1 Telephones: MF 8211, MF 8166

INTERNATIONAL RECTIFIERS

Manufactured by the International Rectifier Corporation of U.S.A. . . . THE WORLD'S LARGEST PRODUCER OF INDUSTRIAL METALLIC RECTIFIERS

INTERNATIONAL SEMICAP



High Q Voltage Variable Capacitor
Q of 1,000 plus at 1 Megacycle

Offering:

- Low Power Requirements.
- Temperature Insensitivity.
- Miniaturization.
- Excellent Reliability.

HIGH Q-WIDE CAPACITANCE RANGE.

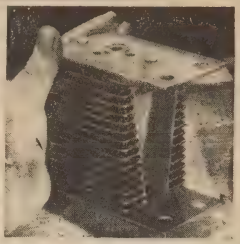
A practical series of new components; capacitors whose capacitance is determined by the applied D.C. voltage. The Q is high, up to 1,000 and the capacity range great. For the first time circuits can be tuned by electrical rather than mechanical methods. The new concept opens up a whole domain of useful applications — allowing in every instance circuit simplification, plus reduction in space and weight. Circuits designed around International silicon capacitors make remote tuning practical. Automatic frequency controls, modulators, automatic gain controls, and band pass filters become smaller, lighter and simpler.

FOR TECHNICAL SPECIFICATIONS WRITE FOR BULLETIN SR-205.

SILICON SOLAR BATTERIES

A new series of Silicon photovoltaic cells for the conversion of light and radiant energy into electrical power . . . with an output greatly in excess of Selenium photovoltaic cells. The solar battery is a primary power source, which may be used in most applications where storage or dry cell batteries would normally be considered. It consists of individual solar cells in a series parallel configuration designed to give optimum power transfer to the load. Power generated by these solar cells in excess of that required by the load can be fed into storage batteries for use during the hours of darkness or overcast periods.

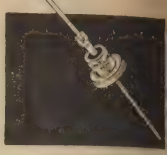
FOR TECHNICAL SPECIFICATIONS, WRITE FOR BULLETIN SR-156.



SILICON POWER RECTIFIERS

Feature a mechanical design that integrates the junction and heat exchanger into one small package, thus permitting quick, simple installation. Rated at 200 amperes rectified D.C. output current in PIV voltage of from 100 to 400 volts. Hermetically sealed within an anodised—cast—aluminium housing highly resistant to extremely corrosive environmental conditions. Designed to withstand shock and vibration far in excess of that encountered in the most severe installations.

SILICON ZENER DIODES



(1.0 watt and 3.5 watt ratings)

For voltage regulation and voltage reference devices requiring:

- Ability to withstand High Temperature and Vibration
- High Current Capacity.
- Long Term Reliability.
- Small size and weight.
- Rugged construction.

PLOT OF CHARACTERISTICS SUPPLIED

Warburton Franki supply a plot of characteristics with each Diode sold—a service unique in this field and one which eliminates guess work and tedious testing on the part of the user.

FOR TECHNICAL SPECIFICATIONS WRITE FOR BULLETIN SR-155

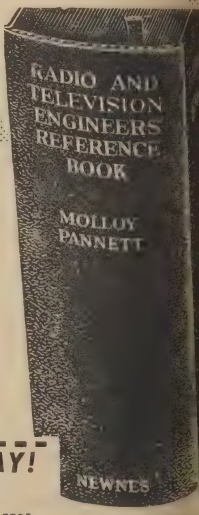
WARBURTON FRANK

380 BOURKE ST., MELBOURNE — MU 834

NEW, REVISED, EXPANDED!

RADIO & TELEVISION ENGINEERS' REFERENCE BOOK

FREE FOR 7 DAYS



BY 41 SPECIALISTS!—THE MOST COMPLETE UP-TO-THE-PRESENT WORK OF ITS KIND — FOR THOSE INSTALLING, SERVICING, DESIGNING, MANUFACTURING TV & RADIO.

Be one of the FIRST TO EXAMINE IT, without cost, without obligation.

EXTENSIVE REVISIONS and a MASS OF NEW MATERIAL. Critical Developments from now matured experience in all aspects. New accomplished and revealing articles cover Communications Theory, COLOUR TV, PRINTED CIRCUITS, Components. Also NOW IMPORTANT & TOPICAL design of VHF-FM; COMBINED AF-FM receivers in GREATLY EXPANDED BROADCAST RECEIVER SECTION; single and independent SIDE-BAND in COMMUNICATION TRANSMITTERS Section; MICRO-WAVE TV & COMMUNICATION RELAY in Broad-band systems and Waveguides sections; NON-ENTERTAINMENT TV, etc., etc.

INCLUDES: *Formulae, calculations, electron optics, studio equipment, transmitter power plant, aerials, amateur radio equipment, waveguides V.H.F. transmitter-receiver equipment, commercial H-F links, navigation and radar, industrial TV, valves, tubes, transistors, diodes, interference, magnetic and disc recording, radio and TV installations and servicing, projection, TV units—symbols, transistors.*

It is impossible to list the very comprehensive contents and expansive sections of THIS NEW OUTSTANDING and AUTHORITATIVE WORK— that's why you are offered a chance freely to examine it in your own home and without obligation. Take your opportunity, POST THE COUPON NOW!

- **NOW more than 1,800 PAGES**
- **NOW more than 2,000 DIAGRAMS**
- **NOW more than 2,500 CROSS REFERENCE INDICES for radio reference**
- **NOW 46 EXPANDED SECTIONS**

POST THIS COUPON TO-DAY!

To: **GEORGE NEWNES (AUST.) PTY. LTD.**
Newnes House, 20-22 Margaret Street, Sydney.

Please send me Newnes NEW RADIO & TELEVISION ENGINEERS' REFERENCE BOOK. It is understood that I may return the work within eight days. If I keep it I will send a first payment of 6/- eight days after delivery and 15/- monthly thereafter, until £5/6/- has been paid Cash price, £5/1/-.

Name .....

Address .....
(Print clearly)

..... State .....

Occupation .....

Signature .....
(Or your Parent's signature if under 21.)

RTERBIO

Place X where it applies.

Householder	
Tenant	
Living with parents	
Lodging address	

A READER BUILT IT!

Gadgets and circuits which we have not actually tried out, but published for the general interest of beginners and experimenters.

ONOMICAL RECEIVER OPERATES FROM CAR BATTERY

small project which we feel be of interest to many read- is a regenerative receiver erating with a reduced high sion supply such as can be ained from a car accumulator.

t at the moment we could not con- making a full scale project of such because there are so many other pressing projects to be fitted in. ver, our correspondent, Mr Ivan ilby of Drysdale via Geelong, Vic- has supplied fairly detailed in- ation and there will be plenty of rs who will be able to go ahead.

OD PERFORMANCE

Kirby writes, "This simple little as an amazing performance des- ts supply of a mere 6 or 12 volts. operating from a 12 volt accumu- and using a 9ft aerial but no all eight Melbourne stations, Gee- Colac and Warragul are received able headphone strength. With an nal aerial 100ft long and 20ft output is excessive and the dial owded with 'joeys.'

dvantages of this set are that it re- s no AC power supply or costly batteries to be discarded when ex- ed. All parts employed can be to convert to an AC receiver and ps expand at a later date.

good second-hand car-type ac- ulator can be pepped up occasional- ith the workshop charger and may old later if desired.

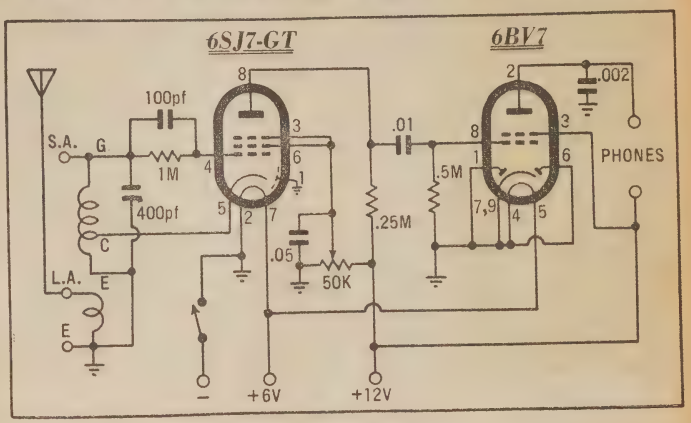
he coil is efficient and allows a tivity/gain adjustment for various tions and aerial sizes. As a tuning citor, one section of a Roblan 2- is used. It is fitted with a vernier Any single gang with a capacity 0004 uF approx. would suffice.

POSALS TYPES

Many suitable disposals valves are lable. The 6SJ7-GT can be replaced a 6AU6 for higher gain or a 6SK7, 6BA6 etc. Any one of the 6BV7, and EL33 is ideally suited for a ll receiver. The less sensitive 6V6- 6AQ5 or 6BW6 would do, having er heater drain. With such a small rating voltage, the output valve ode is earthed.

The set is built on a chassis 6 x 4 x inches. Spaghetti covered 18 gauge e was used for the original but ctically any insulated wire would be rder.

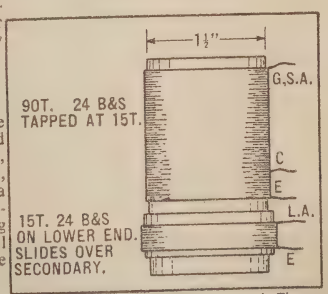
A length of 1½ yards of three core



In this simple circuit the 6SJ7-GT is used as a regenerative detector and the 6BV7 as an audio amplifier to drive a pair of headphones. Although the 6BV7 is intended as a power amplifier to drive a speaker, it is very suitable for the phones when the supply voltage is low.

power flex is used for the battery lead. The red and black wires, each with a 25 amp. clip attached, go to positive and negative respectively. The green wire has a larger and easily distinguishable 50 amp. clip for connecting to the 6 volt connecting strap of a 12 volt battery.

"For 6 volt operation, twist black and green wires together and terminate with a single clip denoting negative. Check that clips are firm and on the correct battery posts as the full 12 volts would ruin the 6.3 volt valve heaters."



Full details of the tuning coil. The position of the primary winding can be varied for best results when using a long aerial. A short aerial may be connected to the top of the tuned winding.

IN 12 VOLTS

It would not be too difficult to rewire the filament circuit to operate from a 12 volt supply. The filament current of the 6SJ7-GT is 0.3 A and that of the 6BV7 0.8 A. If the filaments are connected in series a resistor should be connected in parallel with the 6SJ7-GT to bypass the difference between the two, i.e., 0.5 A.

The voltage across the resistor can be taken as 6.3 V and therefore from R equals E/I, the required resistance is 12.6 ohms.

With this arrangement it would be impossible to do damage regardless of the battery connections.

New Radar Camera

BRITAIN is developing a revolutionary radar camera to take detailed pictures at a range of more than 100 miles.

The new camera would enable high-flying R.A.F. aircraft to establish "open skies" far out over enemy territories without violating frontiers.

Work on the camera has been given top priority and is regarded as a vital addition to Britain's deterrent strength.

It is being developed by the R.A.F. Central Establishhment near Huntington.

NOW AVAILABLE! .. with new-type output transforme

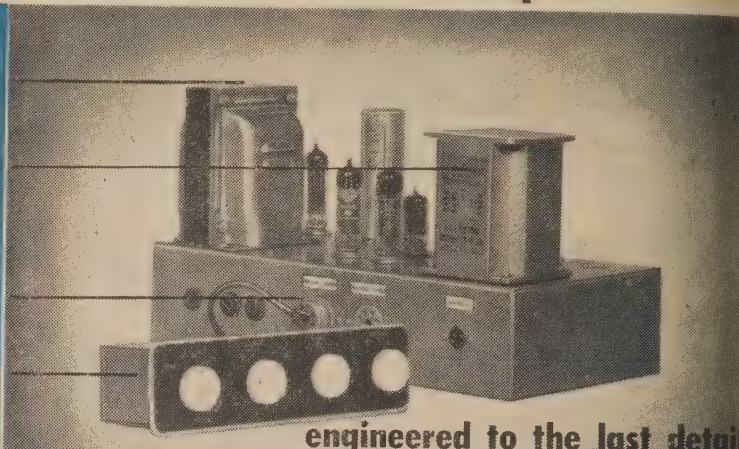
A&R Chassis and Transformer Kit for the Mullard "5-10" Amplifier!

POWER TRANSFORMER

OUTPUT TRANSFORMER

MAIN AMPLIFIER CHASSIS

PRE-AMP BOX



engineered to the last detai

to give your '5-10' a professional appearance!

... ANY UNIT OF THE KIT CAN BE BOUGHT SEPARATELY

UNIT "A" MAIN AMPLIFIER CHASSIS

Comprising.—
Main Chassis.
Bottom Plate.
E.F. 86. Tube Shield
1 Set designation Stickers
1 Packaged Set Plated Nuts
Screws, Washers, Grommets, etc.
Chassis, Bottom Plate, Tube Shield Cadmium Plated and Passivated.
Finished in Silver-Grey Hammer Tone Enamel

UNIT "B" PRE-AMP BOX

Comprising:—
Chassis and Cover.
E.F. 86. Bracket.
Front Escutcheon.
Full Length Registor Strip
1 Set Designation Stickers.
1 Packaged Set Plated Nuts.
Screws, Washers, Grommets, etc
Finish:— As for Unit "A."

ask your A & R. Distributor for illustrated leaflet giving full details of wiring and assembly.

UNIT "C" POWER TRANSFORMER

Type P.T. 1785 — 6.3v. Rectifier
Type P.T. 1786 — 5v Rectifier

Ask your nearest A. & R. distributor for Transformer Specification Sheet giving full details.

UNIT "D" OUTPUT TRANSFORMER

for Pentode Circuitry

Type 2525 As selected

See your Distributor for full technical details.

NEW ULTRA LINEAR OT'S NOW AVAILABLE!

ULTRA LINEAR
Standard High-Grade Silicon Core
2540/8. As selected
2540/15. " "
See your Distributor for full technical details

ULTRA LINEAR
Grain Oriented Core
4000/8. As selected
400/15. " "
See your Distributor for full technical details

Home Constructors can now build the popular "5-10" the easy way! A. & R.'s Chassis and Transformer Kit eliminates those frustrating delays saves you money! The general layout of the main Amplifier Chassis follows closely that shown in the Mullard Booklet "High-Quality Sound Reproduction" The Pre-Amplifier Unit has been re-designed, and both units allow the use of locally obtainable components

DISTRIBUTORS: VICTORIA: Homecrafts P/L. J. H. Magrath & Co P/L. Radio Parts P/L. Warburton Franki. Motor Spares Ltd. **STH. AUST.:** Gerard and Goodman Ltd., 196 Rundle St., Adelaide. **QLD.:** A. E. Harrold, 123 Charlotte St., Brisbane. Messrs. Chandlers P/L. cnr. Albert and Charlotte Sts., Brisbane, Tracson Bros. 157 Elizabeth Street, Brisbane. **W. AUST.:** A. J. Wyle P/L. 1064 Hay St. Perth. **TAS.:** Homecrafts P/L. 220 Elizabeth St., Hobart. **N.S.W.:** United Radio Distributors P/L. 175 Phillip St., Sydney Homecrafts P/L. 160 Clarence St. Sydney AGENTS R. H. Cunningham P/L. 16 Angas St. Meadowbank

A. & R. ELECTRONIC EQUIPMENT CO. PTY. LTD.

378 St. Kilda Road, Melbourne, S.C.1 MX1150, MX1159

W RADIAL BEAM SPEAKER FROM MSP PTY., LTD.

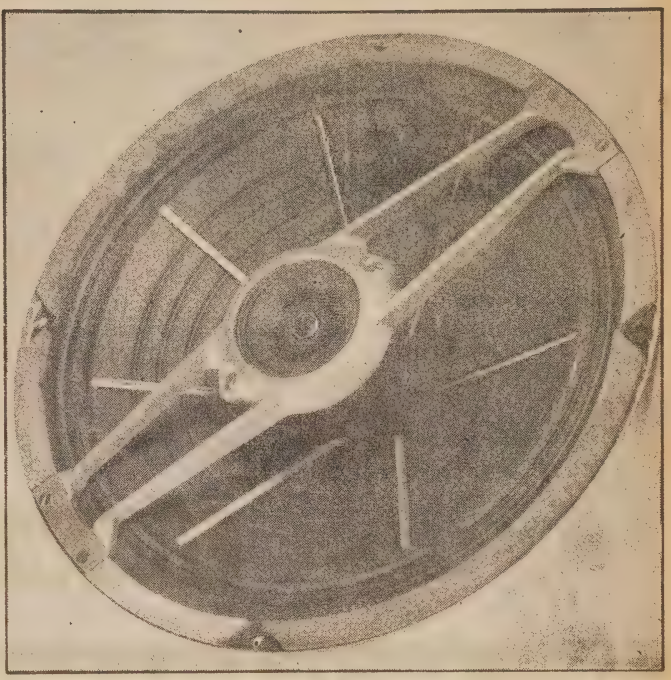
me unusual features are esent in the MSP Radial Beam o-Speaker which makes it ique, at least on the Aus- lian market. One such feature the use of radial metal beams ich stiffen the cone and are sponsible for a very clean bass sponse. Its power rating is particularly high.

ise the speaker lives up to an im- essive waveform illustrated in a bro- describing it, and which shows a output at 40 cycles and 15 watts

has been designed with particular nce to some modestly sized en- res, one of which was used to pro- the waveform referred to.

addition to the radial beams, rub- amping sections have been glued to orrugations at the rim of the cone event reflections from the surround. makers claim that this treatment nany advantages over an untreated cloth surround. Third harmonic tion at 15 watts and 45 cycles is as only 1 per cent.

(Continued on Page 127)



The MSP speaker features radial beams to stiffen the cone, damping sections fixed to the surround, and an offset, co-axially mounted HF unit with a cross-over at 3 Kc.

AMPLASOUND CABINET "WINDSOR" FOR HI-FI

Builders of radio equipment, or purchasers of hi-fi amplifiers inevitably face the problem of obtaining suitable and up-to-date cabinets to house them. Amplasound have a number of such cabinets specially designed for this purpose.

ILLUSTRATED here is one of these cabinets in the Windsor series. The photograph shows a control unit and record player mounted in place. The overall dimensions have been set so that the unit can be operated easily without moving from your easy chair.

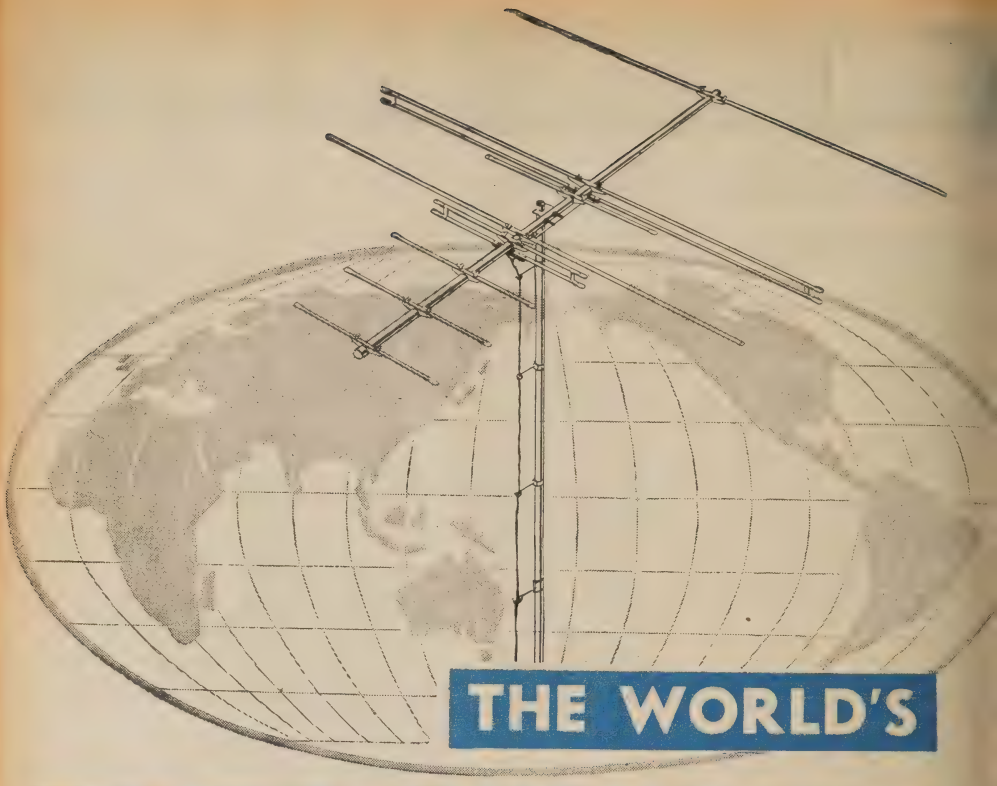
The cabinet allows ample room to mount almost any type of amplifier, control unit, radio tuner, turntable and gramophone pick-up.

A lift-up lid is provided to protect the playing equipment in and out of use.

The cabinet shown measures 34 inches long, 36 inches deep and 10 inches high. Its overall height including the legs is 27½ inches.

It is available in polished maple, walnut or mahogany veneer. The price is £17.

Amplasound, makers of high quality hi-fi equipment, have a city office at 126 Buckingham St, Sydney, and an audition room at 35 Lewis St, Balgowlah. Phones are MX3124 and XJ4193.



THE WORLD'S AND AUSTRALIA'S LARGEST

and why . . .

because Antiference, in their twenty-second year in television aerials, selling in countries all over the world, are more than ever carrying out intensive research and capitalising on their vast experience, to produce better quality products at a better price. Antiference have continually paved the way in television aerial development and this year 1958 they have scooped the pool with no less than three unique features—the Snapfast method of Assembly, Vibration Dampers and Plastic Insulators—features of great benefit to both retailers and consumers.
Antiference are ever seeking to improve their comprehensive range. By their research in laboratories and in the field, their use of only top quality materials, they justify their world supremacy in television aerials.

Antiference television aerials are available from your usual wholesaler or:

ANTIFERENCE
(AUST.) PTY. LTD.
(inc Canberra)

VICTORIA:
360 Smith St., Collingwood. JA 1303, JA 1813, JA 1856
NEW SOUTH WALES:
131 Regent St., Sydney. MX 1104, MX 1197, MX 2314

AF/43/F

THE WORLD'S AND AUSTRALIA'S LARGEST TELEVISION AERIAL MANUFACTUR

HOW THE STEREO DISC WORKS

RTHER DETAILS NEW SYSTEM

s article is supplementary to by the same author which peared in our February issue his year. It carries discussion her forward than was possible that time, and examines par- ularly the behaviour of the us in the now standard 45/45 system.

ecent conversation about the stereo ran something like this: "How on can a pick-up stylus vibrate two at the same time and give different for two preamplifiers?"

at's easy," the answer came. y groove has two walls and one ling is cut into each wall of the e."

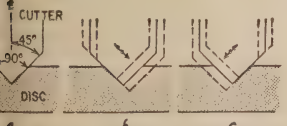
puzzled expression on the ques- 's face showed that this did not him—and for good reason. It is sible for the stylus to follow dif- contours on both walls of the e at the same time. This may have a simple explanation but it was nly not the correct one.

literature issued by Westrex the ence between cutting the two els appears somewhat as in Fig. shows a record cutter that has an between the cutting faces of ely 90 degrees. The two drive anisms, arranged at 45 degrees to ertical, so the total angle between degrees, drive this cutter in direc- parallel to its faces.

nsequently the diagram may make m that the vibrations due to one are recorded in one wall of the e while vibrations due to the drive are recorded in the other

practice, there is invariably some am in both channels and both tions occur at once. So it is more rtant to consider what happens to oint of the cutter than to the con- produced by its two angular cut- edges.

is is because the pick-up stylus will should) ride in the bottom of the ve, cut by the point of the cutter. it is the movement of this point in roove that determines the program



. 1—The basis behind the wrong e that each channel is cut into one ll of the groove in the 45/45 ystem: -no modulation; b—modulation in annel 1 appears to cut only the right ll; c—modulation in channel 2 ap- pears to cut only the left wall.

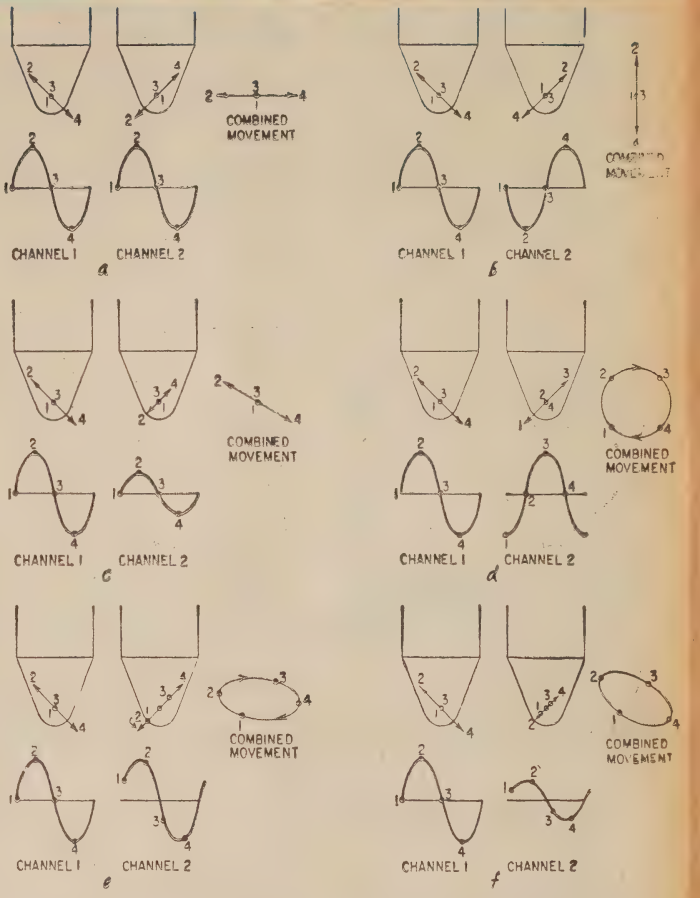


Fig. 2—A more careful analysis of how the cutter, groove and playback stylus move for different intensity and phase relations between channels at any one frequency: a—in phase; b—out of phase; c—intensity difference; d—90 degree phase difference; e—30 degree phase difference; f—intensity and phase (30 degree) difference.

content of the two channels. To clarify this, let us consider what happens with different program combinations.

If both channels carry the same program at the same intensity and in phase, the movement of the cutter and the pick-up stylus will be in the form of a lateral vibration (Fig. 2-a). ("In phase" as explained further down, refers to the system phase, not that of the cutter drive mechanisms.)

But if the inputs are precisely out of phase, the corresponding output from the loudspeakers on playback should also be out of phase, with one loudspeaker pushing when the other pulls. Then the motion of the cutter, groove and pick-up stylus will be up and down in a vertical direction (as shown in Fig. 2-b).

If both channels have the same frequency in phase, but the intensity of one channel is stronger than the other, the motion will be predominantly lateral, with a slight angle but less than 45 degrees (as shown in Fig. 2-c).

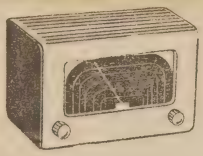
If both channels carry the same frequency, but the phase relationship is neither in nor out of phase, other movements can occur. At a phase relationship of precisely 90 degrees, the motion of the cutter and the stylus will be in a circle (Fig. 2-d). Other phase relations with equal intensity will produce an elliptical movement, as shown in Fig. 2-e.

Finally, if there is a difference in both intensity and phase that does not correspond with either an in-phase or out-of-phase condition, the motion of the cutter and ultimately that of the stylus

By NORMAN CROWHURST

MASTER ELECTRICS PTY. LTD.

A WHOLLY OWNED SUBSIDIARY OF MOTOR SPARES LTD.



ONE VALVE KIT SETS
FOR THE LEARNER

Although this little set is quickly built it looks like a factory job. The wooden cabinet is covered with burgundy leatherette and the dial has all Australian Stations marked in different colours. Parts are mounted on a wooden baseboard and anyone can build it if they can use a soldering iron. Circuit diagrams, wire, solder, etc., supplied. Price of complete kit of parts including Valve Headphones and Batteries. Normal Price £8/5/.

Our price £5/19/6

CHIEFTAIN MIDGET CRYSTAL SETS

Complete—as illustrated with headphone, aerial lead, earth lead, etc., in bakelite case, overall dimensions are 3 3/8in long x 2½ high x 1in deep. Provision for connecting long or short aerials and an extra pair of phones. Using the Germanium type detector, this set is reliable and efficient giving good sensitivity and selectivity.

Price only £3/18/-

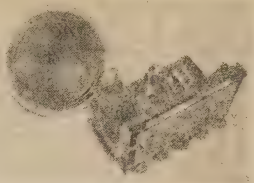
50ft outside aerial, 3/6 extra.
100ft outside aerial, 5/ extra.

RADIOGRAM CABINETS

We have a wide assortment of radiogram and cocktail cabinets available, some secondhand, others new.

Priced from £5 to £60

Please write for information and illustrations, etc.



RADIOGRAM CHASSIS

These radiogram chassis were specifically designed for good quality reproduction of both records and radio programs. A special inverse feed back circuit is employed and well-known American type valves are used, tone and automatic volume controls are incorporated.

The dial is made of perspex and all local stations for each capital city are in large letters and country stations in small. Dial colors are Gold, Maroon, Black and Yellow.

5-valve Broadcast with 7-inch speaker £13/19/6

5 valve Broadcast with 12 inch speaker, £15/19/6.

SPECIALS

1. **Extension Speaker Adaptors.** Simply plug adaptor into 6V6GT or 6F6G valve socket and plug valve into the adaptor and you can connect an extension speaker in any part of the house and switch on the set speaker only, or the extension speaker only, or both speakers together. Usual price for this adaptor, £4/16/. Our price is **£1/10/.**
2. **Dial Cord.** Good quality black linen waxed cord. 10yd reels only **3/ ea.**
3. **2-Gang Variable Condensers.** .0005 capacity, brand new and cartoned. Worth £1/10/. Our price **12/6 ea.**
4. **Red Diamond Crystal Detectors,** semi-fixed type, brand new and boxed. Worth 10/7. Our price **3/6 ea.**
5. **Red Diamond Crystal Refills** for above. Worth 5/4. Our price **1/6 ea.**
6. **Germanium Diodes.** English make, brand new and perfect. Ideal for use as Crystal detectors, rectifiers, etc., in radio and T.V. Sets. Only **4/11 ea.**
7. **Crystal Set Coils** for metropolitan area; very selective. Circuit provided. Only **7/6 ea.**
8. **Crystal Set Coils** for Country, very sensitive. Circuit provided. Only **8/ ea.**
9. **80mA Power Transformers.** 230 volts input. Secondary 385 volts aside. 2.5V at 5 amps, 5V at 2 amps, 6.3V tapped at 4 volts at 3 amps. Brand new and boxed Worth £3/15/. Our price **£2/10/ ea.**
10. **Mica Condensers.** Brand new and guaranteed, 80 PF, 100 PF, 15 PF, 200 PF, 400 PF, 500 PF, 70 PF, 800 PF. Price **6d ea.** .001, .0012, .0015, .002, .002 .003, .006, .007, .008. Price **1/ ea.** .01, .02. Price **2/- ea.**
11. **Wire Strippers,** ideal for strippin all P.V.C. or rubber insulate cables. Worth 5/. Our price 2/ **ea.**
12. **Carbon microphones,** hand typ with switch. **5/ ea.**
13. **Microphone Transformers** t match carbon mike to amplifie input. **4/6 ea.**
14. **Micro Switches.** Several types o these available. **4/6 ea.**
15. **Isocore Speaker Transformers** New and guaranteed in the fol lowing sizes: 600 to 3 ohms 5,000 to 3 ohms, 10,000 to ohms, 12,000 to 3 ohms, 15,00 to 3 ohms. Only **9/6 ea.**
16. **6 x 9 Speakers** with 5,000 ohm transformers. Only **£1/10/ ea**
17. **Rabbit Ears Aerials for T.V.** A good indoor aerial, brand new and packaged. Worth **£3/15/** Our price, **£2.**
18. **Morse Practice Sets,** consisting of Key, Buzzer and Battery. All on solid wooden or metal base These are new. English make and worth £2/5/. Our Price **15/ ea.**
19. **0-9 amp Hot Wire Ameter** for A.C. or D.C. Current measurement. Only **7/6.**
20. **Ferroxcube Rod Aerials,** with coil, ideal for portables. Mantel Sets. Equal to 60ft outside aerial. Price only **16/6 ea.**
21. **E.H.T. Transformers** to give 2,000 volts D.C. to work VRC97 or 5BP1 cathode ray tubes for oscilloscopes or T.V. sets. Circuit provided with each coil. Price **18/6 ea.**
22. **E.H.T. Transformers** for 17 inch T.V. Sets. Price **40/ ea.**
23. **E.H.T. Transformers** for 21 inch T.V. Sets. Price **45/ ea.**
24. **50 mfd 450 volt Tubular Electrolytic Condensers,** pigtail type. ideal for TV. **7/6 ea.**
25. **100mA Power Chokes.** Brand new and boxed, a really good filter choke. Worth 45/. Our Price **15/.**
26. **Twin Shielded Cable,** rubber covered 7-amp cable with empire cloth, covered with woven copper shielding. Price **9d yd.**

SPECIAL NOTICE

All parcels sent Registered Post unless otherwise stated. Postage or Freight must be included with order.

547 ELIZABETH STREET, MELBOURNE — Phone FY0271

Branches throughout Victoria and Riverina

in a modified ellipse as shown in
f.

motions depicted by Fig. 2, of
represent only what can happen
frequency at a time. As prac-
ogram material contains a variety
uencies, at various intensities and
elationships, the cutter, and hence
ely the stylus, performs an endless
of patterns, weaving in and out
and down.
explains the nature of the groove
hat it represents. Now we come
question of how this information
acted from the groove by the
But, before we proceed, let's
p the question of phase, because
t writings and discussions on the
use different terms of reference
parent contradictions arise.

NING OF PHASE

e refer the phase relationship
n the motion in different direc-
o the cutter or pickup mechanism.
others refer it to the overall action
system. The definitions we have
o far are related to system phase.
s based on the desirability of the
direction of cutter and stylus
n corresponding with the in-phase
nation of program in the two
els.
related to the simple cutter design
in Fig. 3, an in-phase movement
two cutter mechanisms will drive
tter vertically because the outward
of both elements results in a
ward movement while the inward
esults in an upward movement.
reverse the phase relationship to
out with the in-phase input to
o microphones producing a lateral
ll that is necessary is to reverse
onnections to one of the cutter
Similarly, if we take careful ac-
of the phasing at the pickup, we
everse one of the connections be-
the pickup and the amplifier or
e speaker, so lateral motion of
ylus results in in-phase motion of
udspeaker diaphragms.
if we talk about cutter or pickup
ng, in-phase action produces a ver-
cut and out-of-phase a lateral one.
referred to the system—the micro-
e input or loudspeaker output, it
t the other way around. To avoid
sion, references to phase in this
e are related to the system rather
to the cutter or pickup mechanism.

W THE PICKUP

sically a pickup for stereophonic
can use the same kinds of trans-
elements, for converting the mech-
l motion of the stylus into elec-
output, as nonstereo pickups. The
common forms are magnetic, mov-
coil, crystal and ceramic. The
these elements operate follows pre-
the same principle as their single-
nel forebears. Now we come to
eal question, how do we separate
wo forms of vibration?
ere are two extremes in the way
can be done. One method separates
two movements at the stylus point
couples them by separate mechanisms
dividual transducer elements. This
e method used in reverse in the
rex cutter head. The stylus is car-
on a fairly stiff rod, in line with
direction of the groove. The two
r motors are directly coupled to
stylus point at 45 degrees in two
tions, as shown in Fig. 3.
he same method of coupling, applied
moving-coil pickup, is exemplified

Fig. 4a (left) and 4b (right)—The Fairchild cartridge, a moving-coil type, uses the same stylus arm to transmit the combined vibrations to a double-coil assembly mounted in the same magnetic field.

in the Certojon design. It uses two d'Arsonval type moving-coil mechanisms, similar to their well-known single-channel design, both coupled to the same stylus. The stylus is the common point at which the drive separates the two moving-coil transducers.

At the other extreme the stylus motion can be conveyed by a common arm to a pivot or some kind of combination transducer where the two outputs are obtained electrically by separation in the transducer action itself. An example that excellently illustrates this method is the Fairchild stereophonic pickup.

The illustrations are a magnified view of the central element of the professional model of this pick-up. As shown, the bobbins are empty and the actual coils have not been wound. The transparent plastic bobbins can clearly be seen at 45 degrees to the square frame. The thin wires passing through the centres of the side suspend the coil assembly and provide a restoring force to centre the coil in its neutral position.

The stylus arm, shown coming down at approximately a 45 degree angle, can move in almost any direction and produce a corresponding combina-

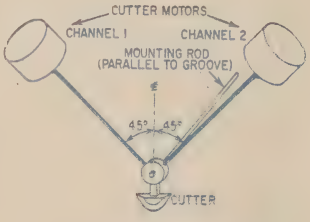


Fig. 3—Basic action of the Westrex cutter couples movement in two directions right at the stylus.

tion movement in the coil. The magnetic field that produces the electrical output when the coils move is produced by pole pieces in front and behind the square. The magnetic poles are not shown because they would obscure the mechanism.

Obviously, if the stylus moves at a 45 degree angle one way, one coil will be rotating about its own axis, and otherwise not moving, and will produce no output, while the other coil will be rotating like a d'Arsonval coil between the two pole pieces and produce an electrical output (Fig. 4-a). Motion in the opposite 45 degree direction will make the first coil produce an output, while the second one rotates about its own axis and does not produce any output (Fig. 4-b).

This construction produces better than 20-db separation between the two motions, over a frequency range extending from the low end up to the region about 10,000 cycles. Above this, separation is not so good, although the response of the pick-up is maintained.

These may be regarded as two extremes in method. Practical pick-ups may well bridge the gap and produce results by methods that would be difficult to list under either one of these extreme headings, perhaps coming close to achieving it by both of them.

CRYSTAL TYPES

The new Electro-Voice design is one such method. This pick-up is illustrated by Fig. 5. Like the Westrex cutter, the stylus is supported by a horizontal rod in line with the direction of the groove. However, a much more flexible rod is used because a stereo pick-up requires a high compliance, or flexibility, while the cutter requires quite a reasonable stiffness.

The stylus arm drives the crystals through a triangular piece of compliant or elastic material. Motion at one 45 degree angle drives one crystal while not moving the other one and vice versa.

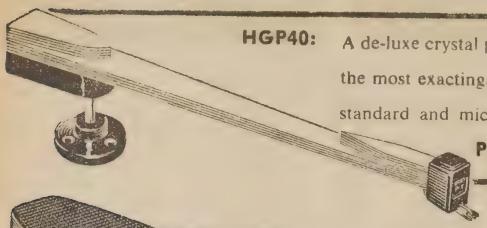
As a crystal is basically a stiffness or compliant device (the drive force is used to bend it rather than move it) and these elements in this cartridge are rigidly mounted at their other end, the compliant drive from the stylus arm to the crystal represents a mechanical potentiometer, both elements of which are a compliance or stiffness. This means that if the compliance of the coupling element is five times that of the crystal, then the motion at the tip of the crystal will only be one-fifth of the stylus' motion in that particular direction.

As crystals produce a high output from a microgroove recording, this method still delivers enough output for any high-fidelity preamplifier and it has the advantage, over the more usual method of coupling through a mechanical lever system, that mechanical lever resonances are completely avoided. The dominant mechanical impedances presented to the stylus point is the compli-

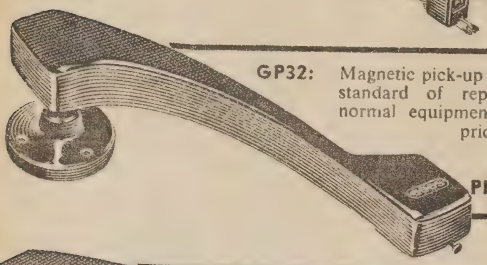
offering you the widest range of pick-ups .

acos

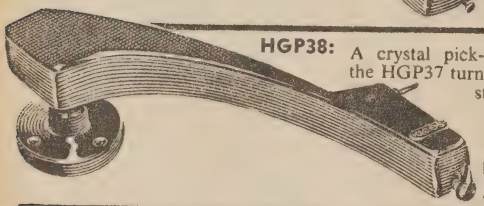
CRYSTAL MAGNETIC • CERAMIC



HGP40: A de-luxe crystal pick-up to satisfy the most exacting. Complete with standard and microgroove heads **PRICE, £9/15/-**



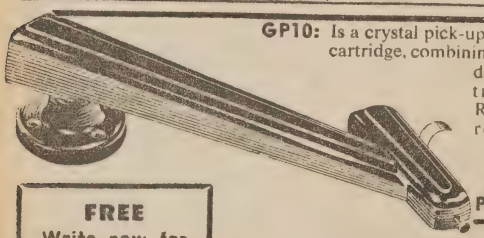
GP32: Magnetic pick-up provides a good standard of reproduction with normal equipment at reasonable price. Output voltage, ½ volt at 1,000 c.p.s **PRICE, £2/12/6**



HGP38: A crystal pick-up. Incorporates the HGP37 turnover cartridge for standard or microgroove recordings with cantilever stylus **PRICE, £5/15/-**

GP50: Is a HIGH-OUTPUT crystal pick-up suitable for reproducing standard and microgroove records through *low-gain* amplifiers as used in small record players and some radios **PRICE, £4/19/6**

GP60: Incorporates the latest-type CERAMIC cartridge—unaffected by heat or humidity. For use in tropical areas. **PRICE, £6/16/-**



GP10: Is a crystal pick-up utilising the GP9 cartridge, combining purity of reproduction with extreme reliability. Resonance-free response from 50/8,000 c.p.s. Output, 1.5V at 1,000 c.p.s. **PRICE, £3/12/6**

FREE
Write now for illustrated technical literature on any of the products shown on this page.

plus these

acos

replacement cartridges

HGP39 CARTRIDGE
Designed to meet the most exacting requirements of modern recordings — low element mass and very high compliance enables the heaviest modulation possible to be traced with a minimum of record wear. Both standard and L.P. heads available. **PRICE, £3/12/6**

GP9 CARTRIDGE

Now famous as the cartridge with the unbreakable crystal. Takes standard steel or fibre needles for 78 r.p.m. records. **PRICE, £1/11/6**

GP59 CARTRIDGE
A HIGH-OUTPUT cartridge suitable for reproducing standard and microgroove records through low-gain amplifiers. **PRICE, £2/3/-.**

CARTRIDGE GP61

A CERAMIC cartridge that will withstand the rigours of a tropical climate and is, at the same time, very robust. **PRICE, £3/19/6**

HGP37 CARTRIDGE
A TURNOVER cartridge with cantilever stylus that utilises a new method of crystal drive, a bisectional control element that achieves independent characteristics for standard and microgroove. **PRICE, £2/18/6**

Sole Agents in Australia:

AMPLION (A'SIA) PTY. LTD.

101 Pyrmont Bridge Rd., Camperdown, Sydney, N.S.W. Phone LA6124

of the stylus arm itself and its coupling member.

there is any mechanical resonin the crystal element within the range, it will modify the fresponse but will not produce the ing effect upon the record usually ated with crystals. Also the use s "potentiometer" arrangement re the magnitude of movement rein the crystal and lets it operate range where it is essentially linear. ving the crystal harder (as the al lever system does) would run it nonlinear extremes.

ARATION

th this pickup, separation of chanreally takes place in the triangular of compliant material. But as this piece of material and not two sep- links, it seems to "split the differ- between the extremes we started vith. An advantage of this design relative purity of the separating od achieving a high order of disnation against cross-modulation.

her variations in the method of ing the output can be seen by look- it possible ways of doing it in a netic construction (see Fig. 6). Here, lug of magnetic material that pros the variation in magnetic reluc- is attached directly to the stylus and varies the reluctance of both netic circuits, one for each channel. on at one 45 degree angle will ge the gaps in that direction but not e other direction, and there will be utput from only one coil. Motion e other 45 degree angle will produce utput from the other coil. The comted motion of the stylus following reophonic groove produces an outrom both coils in the desired stereoic relationship.

om this discussion it is evident that are a variety of ways to make ips for stereo discs. Also it is evi- that there are no serious problems tting the discs. A feedback cutter, as the Westrex, will do a good job separating the two channels and ding cross-talk, provided the two s are mounted precisely at 90 des to each other. So what are we ing for? Why have not standards laid down and records already in uction, with pickups to play them?

KING A START

ere we have a "which came first, chicken or the egg?" type of prob- The pickup manufacturers are ing for test records to determine how their pickups are, while the record ufacturers need some way to meaprecisely what they have cut on a rding. The pickup manufacturers looking for a perfect or at least quate test disc or series of test discs, le the recording manufacturers are king for a perfect pickup or one adetely within range, to determine prely what they have on their record-

hen there has been the decision about appropriate groove contour—should angle be exactly 90 degrees as sug- ed by Westrex, or would other les, such as the system proposed by S, also be suitable. Also the correct tour for both cutter and stylus has been selected. Will the contour standard in the industry for monove be used or some other contour? n we need some way to test for inhannel intermodulation, cross-modu-

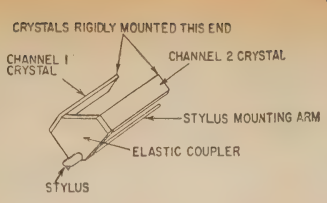


Fig. 5—The Electro-Voice stereophonic pickup uses crystals and transfers the vibrations through an elastic piece that separates them.

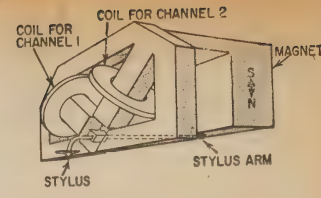


Fig. 6—Another possibility is shown in this diagram of a composite two-coil magnetic assembly.

lation and other effects that were completely unknown with monogrooves. The official approval of the Westrex system (which is interpreted to include the CBS technique) may hasten action in standardising these other points.

Perhaps we should point out here that there is a difference at the cutter end between the **drive** being at precisely 90 degrees, or two separate 45 degree angles, and the **angle of the cutter wedge** being the same. If the stylus really runs along the bottom of the groove, it is not important to have the angle of the groove a precise 45 degrees or 90 degrees. Any angle, so long as it is suitably standardised, will serve the purpose. The important thing is that the stylus must be able to ride the bottom of the groove correctly.

In the design and testing of pickups there are some problems to settle. For example, the Fairchild professional pickup has a stylus-arm angle of about 45 degrees sloping forward (quite apart from the 45 degree angles of the coils themselves). If the stylus only moves laterally, its motion will be similar to that of any lateral recording. But if the stylus follows a vertical component, even though this may be a partial component due to both the 45 degree elements, the up-and-down movement of the stylus will also produce a component (approximately equal to it) back

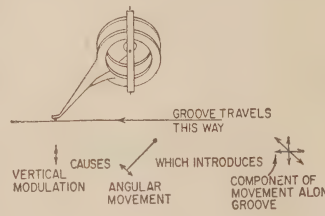


Fig. 7—How an unduly steep stylus-arm angle might cause the vertical component of stylus motion to frequency-modulate the recorded program.

and forth along the direction of the groove (see Fig. 7).

This will amount to a Doppler effect along the groove or will result in effective frequency modulation by the vertical component. As the vertical component is not confined to one of the program channels in 45/45, the combined vertical or out-of-phase component of both channels will produce frequency modulation.

We could go on to theorise about this but the real question is, does it really produce distortion? And if it does, is its effect audible as a deterioration of program quality? This is one of many things that still have to be proved. However, it is interesting to note that a new Fairchild pickup has a stylus arm that comes much nearer to being horizontal.

UNWANTED RESONANCE

Another thing, this discusison is based on the motion of the stylus remaining simple at all times—we assume it pivots about the cross-bar junction in the centre of the coil. But if the vibrations run into resonant conditions of the cross-wires or stylus arm at any frequency instead of the stylus assembly vibrating as a whole, the investigation becomes even more complex and it is possible that some form of intermodulation or other distortion not yet considered may take place.

Each kind of pick-up, and each design approach, will have its own problems. In general, the simplest mechanism is most likely to avoid troubles. But the only real way to determine the effect of these different possible forms of distortion is to measure them—to get test discs with different frequencies recorded on the respective channels, determine possible cross-modulation from one chanel to the other, or intermodulation of the audio on one particular channel by other tones on either chanel, etc., using discs yet to be made.

DISTORTION

Finally, having discovered what degree of intermodulation or cross-modulation exists with any particular pick-up or record combination, we still have to determine whether this is important in terms of the end result—listening to the stereophonic program. It must be conceded that all of the pick-ups recently demonstrated have produced quite listenable stereophonic presentation, even though a rigid theoretical discussion might suggest that some terrible distortion occurs.

From the work done so far and the technological improvement achieved to date, it is evident that stereo discs have a great future. There will be a little shakedown period—getting the bugs out and determining what kinds of distortion really matter or whether they are really present at all—and then it seems we shall have a golden opportunity for getting stereohonic program at a cost no greater than regular LP's.

Since this article, reprinted by arrangement with Radio-Electronics, was written, some definition of standards has taken place. It is probable that the author's reference to the "bottom" of the grove refers to a position well down into the groove as against a higher position near the shoulders. To date no exact clarification of this point has been made by the recording industry.

'STEREO'

Hear Stereophonic records ea
Saturday 10.30 a.m. to 12 no
at our Showroom . . .

Special Demonstrations
arranged by appointme

"Ronette" Bino Fluid Stereo Cartridges available from stock! Price £4/5/6

THORENS RECORD PLAYING EQUIPMEN
Fitted with New GE-VRII cartridge

AVAILABLE IN THREE MODELS

Model CB33N

Manual Player with Automatic stop (as illus.) **£35/15/-**

Model CBA83N

Automatic Player with Manual control **£44/17/6**

Model CD43N

Fully automatic changer with Pause Control and facilities for manual operation **£59/10/-**

All above units use the Thorens Precision E53 motor and turntable assembly. The GE VR11 cartridge is available separately priced at £8/14/6.

All units available with Diamond LP Styli for additional cost of £8.

Also Available

Thorens Model TD124. Transcription Turntable 4-speed with inbuilt levelling device and Stroboscope, clutch action instant start—absolutely the most silent motor in operation available today Price **£73/15/-.**

Arriving this month . . . Model TD124L fitted with specially designed pick-up arm for Stereophonic Reproduction.

VISIT OUR SHOWROOMS

"Sound is our business"

Fidelity AE **Audio Engineers PTY. LTD.**

PHONE BX6731

422-424 KENT STREET SYDNEY

ADDITIONS TO SWEEP GENERATOR

re are some modifications and additions to the Sweep and Marker Generator which will further improve its performance, particularly on the higher frequency bands. There are also a few points on alignment in general which should prove valuable.

e we first described this instru- March and June, 1957) it has been stant use in our own laboratory s done a mighty job in checking -checking the wide variety of IF which we have encountered in that

have also had the opportunity of ig it against commercial instru- and, while lacking some of the s of the more expensive types, it oduced virtually identical response when compared directly on the F strip.

instrument was primarily design- cover the 5.5, 10.7 and 30 Mc used for the TV and FM IF chan-

We did have ideas about using nics to cover the actual TV chan- nd even provided a 60 Mc coil ther this scheme, but we never ed this up very seriously, mainly e our need for it was not very at the time, and we were so busy er directions.

RALL CHARACTERISTIC

re recently, however, we have felt ed to view the overall response of ers, and this has revived our ideas harmonic operation. This article ed on this work.

two main problems were to im- the attenuation at these fre- ies and to provide a balanced out- uitable for normal IF tuner inputs. simple resistor network shown is at is required to convert from un- ced to balanced output. In addition, vides an impedance of approximate- ohms as seen by the generator, 00 ohms as seen by the tuner. This es the requirements of both pieces uipment.

e next problem was to house this rk on the end of the cable, and in that readers could duplicate easily; ast requirement caused much rum- g in the junk box. We finally dis- ed that an old four pin valve base om an old 80 etc.) is a close fit a standard aerial or oscillator coil he two forming the basis of a very little housing.

The can should be cut off to a length of about 1¼in. Mark off the required distance, then wrap a piece of paper around the can so that the edge coincides with the mark. This provides a guide to enable a true cutting line to be drawn.

A hack saw with a fine blade is used for the actual cutting, and the can is best supported by forcing it onto a scrap of timber dressed roughly to the correct size. This should be held securely in a vice.

Avoid cutting right through the material at any one point, but turn the can continuously so as to produce a shallow groove. This is gradually deepened and a break through at any point can then be quickly followed around the groove.

The four pins on the valve base are drilled out and all four holes thus produced are put to good use. Two accommodate the two terminals, one provides a mounting point for an internal tag strip, and the fourth is used to bring out the earth braid. The terminals (one red and one black) are the universal type suitable for standard tip jacks as well as plain leads.

A three-tag terminal strip fits easily inside the base and simplifies the termination of the cable and mounting of the resistors. The centre lug is used to terminate the earth braid of the cable, while a short length of braid runs from this same point through the remaining hole in the base. This ultimately connects to the can.

MECHANICAL

The can is secured to the base by means of two 1/8in x ¼in round head screws, and suitable holes are drilled and tapped in the base to receive them. One hole should be located opposite where the aforementioned braid emerges.

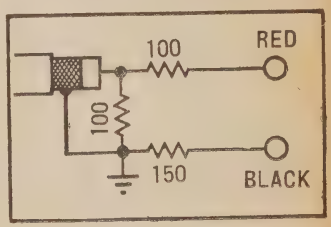
To assist in keeping the holes in the can and base lined up correctly, drill the tapping hole through both, then enlarge the hole in the can and tap the one in the base. Fit a screw to this side before commencing work on the other side.

Two solder lugs are fitted under the screw nearest the earth braid and the braid is taken directly to one of them. A length of braid is also soldered to the second one and terminated in an alligator clip. This lead is best kept short and it need not be longer than about one inch.

In use, the unbalanced output is between the red terminal and the earth braid, and the balanced output between the two terminals. Quite naturally a moderate amount of attenuation is introduced by this pad, but this is more an advantage than otherwise.

The attenuation problem is really one of leakage, particularly leakage past the attenuator. It is most serious because it is seldom constant at all frequencies within the swept band. Thus, a level output at maximum setting may become quite ragged at, or near, the minimum setting.

Also, the minimum output setting will not coincide with the physical minimum



The circuit of the pad is quite simple. Half watt resistors are used and should be carbon types. The cable is 70 ohm co-ax., such as PT1M or PT9M.

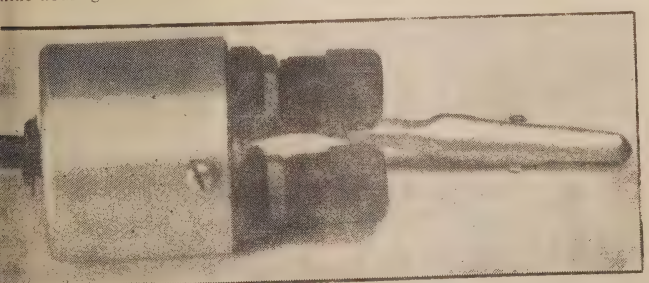
position of the pot. but will be a few degrees up from this point. In general, the closer these two points, the better.

Some of this can be due to stray capacitances within the pot. and there is not much that can be done about this except to keep the value of the pot. as low as possible. The 500-ohm carbon pots. now available may be a little better than the 1,000 ohm type used originally, but this is about the lowest practical limit.

ALTERNATIVE ARRANGEMENT

A better scheme would be the use of a course attenuator in addition to the pot., probably based on the "ladder" principle, but it is hard to fit this into the existing space or panel layout. A ganged or dual pot. is another suggestion, and this could probably be accommodated if the 30 Mc coil were moved. However, the stray capacitance within each section would still be a problem. We have not been able to fully explore these ideas at present.

We also found evidence of leakage



e complete unbalanced to balanced pad is a professional looking unit in spite of the scrap materials employed. Note the "universal" type terminals employed.

‹PRONTO› SOLDERING GUN

★ IS PRONTO!
HOT IN 5 SECONDS.

★ YET COOL IN YOUR HAND.

★ SHOCK & KNOCK PROOF CASE.

★ PROVIDES ITS OWN LIGHT.

★ ALWAYS CLEAN AND READY TO USE.

★ ONLY WEARING PART IS THE TIP—QUICKLY REPLACED WITH 14 GAUGE COPPER WIRE.

Approved by S.E.C.
app. No. V'RX'A1

Buy—PRONTO—and have no further expense.

Obtainable from — Homecrafts — Rowco and other leading Electrical Stores.

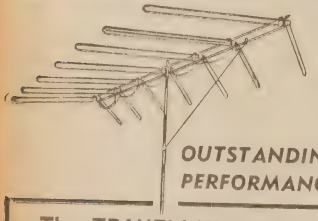
Manufactured & Distributed by

TRANSFORMERS MFG. CO. PTY. LTD.

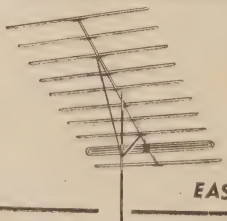
ARGYLE ST., FITZROY, VICTORIA. TELEGRAMS: "Transformers Melbourne."

Make your TV Aerial a "CHANNEL MASTER"

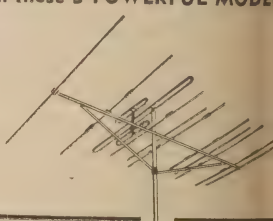
FOR INNER-FRINGE, FRINGE and SUPER-FRINGE AREAS choose from these 3 POWERFUL MODE



OUTSTANDING PERFORMANCE



AMERICA'S BIGGEST SELLING AERIALS



EASY TO ERECT

The TRAVELLING WAVE

This revolutionary aerial provides . . . Ideal phase relationships on all channels . . . Optimum impedance matching on all channels . . . Equal flow of current in all dipoles on all channels . . . fullest use of transmitted energy on all channels—all elements except reflector are "driven." In short—fabulous performance on all channels.

3 Element £22/18/6
5 Element £32/10/6
7 Element £42/15/

The 10 ELEMENT "YAGI"

● 10 elements—more signal, less noise, less rear pick-up ● Highest gain of any Yagi ever developed ● Over 30% more gain than any 8-element Yagi ● Can be stacked, with 78% additional gain over single bay ● Excellent 300-ohm match in all installations.

Low Band, £27/19/6; High Band, £14/12/. Also 5-Element Yagis for inner-fringe areas: Low Band, £13/6/; High Band, £9/3/6.

The SUPER RAINBOW

● The world's first Triple-powered Yagi . . . most powerful all-channel VHF aerial ever produced ● No other aerial is so well prepared to meet every possible expansion of TV in Australia ● No other aerial has such uniform high gain, flat frequency response, extremely narrow polar patterns, highest front-to-back ratios.

£33/6/9

COMPLETE RANGE OF . . . TV AERIALS AND . . . . . ALL ACCESSORIES

Everything ON DISPLAY

WARBURTON FRANKI (MELB.) LTD.

359 LONSDALE ST., MELBOURNE — PHONE MU 8351

QUEEN ST. LONSDALE ST. ELIZABETH ST.

EXPERT ADVICE

the marker generator. Sweep was finding its way into the mark- being coupled back into the out- uit via the 5.5 Mc lead to the socket. A high frequency choke heater lead helped considerably. chokes used were some ex-dis- types originally used for similar ion in 30 Mc radar IF strips. e wound on ¼in diameter ceramic , use aproximately 26 gauge wire, ve 22 turns. Something similar not be hard to make.

S FILTERING

tional filtering of the mains also helpful, and one of these chokes ed in each lead, both sides of each being by-passed with .01 mfd ors.

also found that an unshielded 5.5 ble between the crystal oscillator sweep output appears to be bet- a shielded one, though this may ndom effect and not apparent in es.

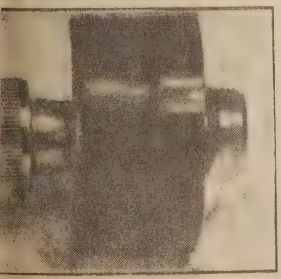
e leakage was also evident from -AMP" lead running to the CRO. easily avoided by fitting an isolat- istor between the generator ter- and the lead. The value is not , and anything from 1000 ohms do.

as much as possible done to se the actual leakage, the next to minimise its effect as far as e. Since the leakage is only serious he minimum position of the pot. ig which makes it unnecessary to is position will help, and suitable ts of external attenuation will do

already mentioned, moderate at- on is provided by the balanced palanced pad, and this is some Additional attenuation may be ed by means of the pads de- l in last month's issue (page 65), othing more may be needed if are likely to be on hand.

TIONAL ATTENUATION

ther approach is to provide an al pad which will screw directly front of the instrument between rmal outlet plug and the cable. ircuit for this is quite simple, as , and it is also easy to make. s time we used a discarded Mar- pot, from which the works had emoved, leaving only the moulded nd metal cover. A plug is simply ed on to the moulded portion, and ket soldered to the metal cover.



completed external attenuator. old pot. body and cover makes eat housing and may be finished a coat of glossy black lacquer. crews directly on the front of the generator.

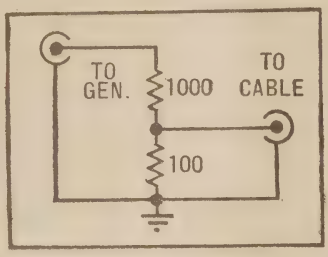
Portion of the socket shank will need to be cut off to facilitate this.

When the two portions are completed the two resistors are assembled inside the moulded section and an earth lead brought out through one of the old terminal slots.

When assmbled the two sections are held together by means of 1-8in screws in tapped holes as before, a solder lug under one of these serving to complete the earth connection to the metal cover.

The values given will provide around 20 db of attenuation and this seems to be about the best compromise. When time permits, we have ideas about fitting a small 500-ohm pot in this same housing to provide a variable pad. It looks as though at least one make can be accommodated and might be worthwhile in spite of some obvious limitations.

Requirements will vary with different sets, but we obtained best results using the second harmonic of the 30 Mc band for channel 2, and the third harmonic of the 60 Mc band for channels 7 and 9.



The circuit of the attenuator. The resistors are half watt carbon types and the values shown provide approximately 20 db loss.

Considerably less sweep is required for harmonic operation, and correct adjustment of the sweep and fine tuning controls will permit a normal size pattern to be obtained. The marker generator may still be fed into the IF channel and the total bandwidth assessed in terms of the familiar IF points.

By lightly coupling an aerial to the tuner the station carriers may be used as vision and sound markers, serving as an additional check for both the receiver and the marker generator.

ALIGNMENT POINTS

While the vertical deflection voltage for the CRO may be obtained from the detector circuit, using an isolating resistor to minimise the risk of regeneration, we found that it is much safer to take the signal from the plate of the video amplifier and where there is much less IF energy.

Another catch is overload. Although some forms are evident enough by reason of the sudden flattening of the response curve, others are more subtle. If, for example, one early stage is being overloaded, then the response at that point in the curve will be distorted, though not necessarily in an obvious manner. However, suspicion should be aroused whenever a particular part of the curve refuses to "grow" with the rest when input is increased.

These points, together with the additions and modifications, should result in a more versatile instrument and more accurate results from it.

TV

Brass Tuner Chassis, R. and H. type. 19/6, plus 25% tax. 1/4 postage.

AUDIO

Linear Output Push Pull Transformer, full fidelity, tapped two positions, one for beam tubes, 6V6, 5C7, etc. One for penthode as EL84, EL34. Uncased. Weight approx. 5½lb.
£4/5/ plus tax.

Linear single output, full fidelity, tapped. 5 watts, £2/19/6, plus tax.

Instrument Transformer, 240 A.C., 150V 15 mills, 4 and 6 volts, 2 amps.
£1/19/6, plus tax.

Step down Transformer, 3 amp, 240 A.C. to 12V or 6V, 20/, plus tax.

OSCILLOSCOPE CASES

The R. and H. type, wide band, complete set of chassis and fittings, punched ready to assemble in latest charcoal grey instrument colour with figured front panel.
£10/19/6 plus tax 12½%

The fundamental Kit, consisting of chassis and fittings with case, front panel and figured front panel.
£5/19/6, plus tax 12½%

The case only—
£5/19/6, plus tax 12½%

The R. and H. type figured front panel, 19/6, plus 12½%.

The economy kit, consisting of case and one unpunched chassis suitable for simpler type of Oscilloscope, £4/19/6, plus tax, 12½%.

Oscilloscope, R. and H. type tube shield, 5 B.P.I.,
£3/19/6, plus tax, 12½%

FIGURED FRONT PANELS

for R. and H. designs. Vacuum tube voltmeter, multimeter, sweep and marker generator. Oscilloscope, figured with all holes punched, black background, silver figures, 19/6, plus 12½ per cent tax, plus postage 1/4.

Standard Instrument Cases. Finish Grey.

Cat. No.	Long	High	Deep	Prices plus 12½% S.T.
MC6	6	6	6	11 9
MC5	9	6	5	12 10
MC7	10	8	7	17 10
MC67	12	7	6	19 9
MC81	10	10	8	1 3 6
MC811	12	11	8	1 8 3
MC82	13	8	6½	1 8 3
MC79	15	9	7	1 11 0

Sloping Front Cases

SF7	7½	6½	6	15 3
SF79	9½	6½	7½	19 6
SF71	11	6½	7½	1 2 0
SF8	13	8	8½	1 6 6
SF10	18	10	10	2 1 0

R. & H. type Cabinets, finish charcoal grey, louvred sides, welded corners. Plus tax, 12½%.

MC5A	9	6½	5½	18 9
MC82A	13	8	6½	1 12 3
MC87A	15	10	8	2 2 0

Sloping Front for Multimeter.

SF7A	7½	7½	7½	1 1 0

Mackinnon and Nicholls Ltd., 468 Collins St., Melbourne.

R. H. Oxford & Sons Pty. Ltd.

97 Marriott St., Redfern, N.S.W. MX3764

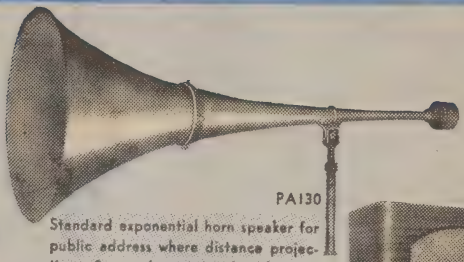
SWITCH TO AWA

PUBLIC ADDRESS SPEAKERS

THE MOST COMPREHENSIVE RANGE OF SPEAKER ASSEMBLIES FOR EVERY REQUIREMENT.

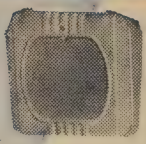
PA138

Standard reflex horn speaker for medium distance projection of speech and incidental music.



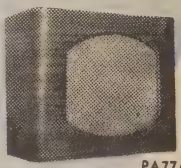
PA130

Standard exponential horn speaker for public address where distance projection of speech and incidental music is required.



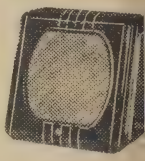
PA150

Attractive moulded ivo cabinet with 7" co speaker and 600 ohm li transformer. Suitable f wall or desk mounting



PA77/12PS

Polished timber cabinet for wall or table mounting with 12" cone speaker and 600 ohm line transformer.



PA150/W

Moulded walnu speaker similar t above. These model are also available with 600 ohm stepped faders.

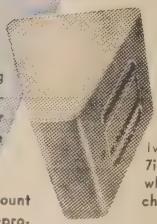
RESLO DRIVE UNITS: PA108 & PA109 SU10 & SU12

Exclusive features are the self-locating diaphragm and the concentrically interlocked magnet which together produce an undisplaceable mechanical assembly, proof against decentering.

These flare baffles are for use with 7in and 12in permanent magnet cone speaker units and provide high conversion efficiency.

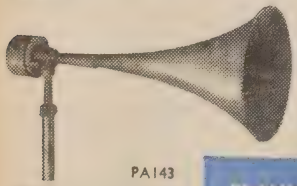
PA118

Pendant type, ceiling suspension, 360° diffusion speaker suitable for distribution of voice and music.



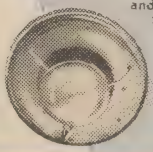
PA73

Ivory timber cabinet with 7in speaker for applications where a bi-directional characteristic is desired.



PA143

Short exponential horn speaker for distance projection of speech only.



PA177

Flush, ceiling mount 360° diffusion reproducer with 7" cone speaker. Can be colour matched to suit any background.

PA178

Surface mount reproducer similar to PA177, for use where flush fitting is not practicable.

PLANNED FOR OPTIMUM FAITHFULNESS OF SOUND REPRODUCTION, IN KEEPING WITH PHYSICAL AND COST REQUIREMENTS, IN STYLES AND FINISHES TO SUIT ANY BACKGROUND OR CIRCUMSTANCE OF USE.

AMALGAMATED WIRELESS (AUSTRALASIA) LIMITED

47 YORK STREET, SYDNEY. B0233. 167 QUEEN STREET, MELBOURNE. MU9161.

AVAILABLE IN OTHER STATES FROM

NEWTON McLAREN LTD., ADELAIDE. NOYES BROS. (MELBOURNE) LTD., HOBART AN LAUNCESTON. CHANDLERS PTY. LTD., BRISBANE. NICHOLSONS LTD., PERTH. ALSO FRO LEADING WHOLESALERS.

EW BOOKS

NDARD WORK

NDATIONS OF WIRELESS by S. Scroggie, B.Sc., M.I.E.E., pub- for "Wireless World" by Iliffe and td. Stiff cover, 349 pages, 8½in in. Illustrated by over 200 line gs, graphs and circuits.

is the sixth edition of a book lly written by A. L. M. Sowerby 6. The third edition was revised nlarged by Mr Scroggie in 1941 ubsequent editions have been the of his work, particularly the fifth which was entirely rewritten in The main feature of this latest is a chapter on semiconductor and transistors. According to blishers, over 160,000 copies have sold.

heck through the book confirms he original objective, of providing less introduction to those with no us knowledge of the subject, has achieved. All basic radio theory practice has been covered in the style for which the writer is is in his "Wireless World" articles.

ne of the headings on some of the dual sections are: "Initiation Into northand of Wireless," "Elementary ical Notions," "Capacitance," "In- nce," "Alternating Currents," es: The Simpler Types" and toward nd of the book some of the total chapters are devoted to subjects as "Selectivity," "The Super- odyne Receiver," etc.

ogether a book which we would ad to recommend to any beginner. r copy from the Technical Book Magazine Co., 295 Swanston Street, ourne. The price is 20/9 plus 1/6 ge. (M.V.F.)

R TAPE USERS

EMENTS OF TAPE RECORDER CUITS, by Herman Burstein and y C. Pollak (Gernsback Library, York).

is not so many years since a writer d just fill a book with everything vn about tape recording from Poul- Telegraphone to explanations of working of AC bias.

ow we have reached the stage of ialist books on the subject. "Ele- ts of Tape Recorder Circuits," just ived from the Gernsback Library, s all of its 223 pages just to explain t designers of tape recorder ampli- try to achieve. There is no room any discussion of transport mech- ms, motors, microphones or speakers. he authors, Herman Burstein and ry C. Pollak, are two audio engi- s. They take almost repetitious pains xplain in a simple, readable way the tronic problems of recording and ing tape. Many of the aspects tioned are illustrated with examples n American commercial practice but e are unfortunately no complete matics of typical designs such as R. B. Hickman used in his recent "Mag-

L.B. PRODUCTS NEW MINIATURE

half track TAPE HEADS Types H4 & EH4

Universal high impedance tape heads for replacements in commercial recorders, wide tape recorders, etc., main features are:— Deep-drawn one-piece mu-metal case for maximum magnetic shielding. Miniature size, .7" wide, .375" high, .75" deep.

Gap flush with curved front of case, permits recording on any width tape
High impedance astatic windings, 9mV output at 7½in per sec.
Wide range response, .0002" gap.
NOTE:—Types H4 and EH4 are NOT suitable as replacements for other L.B. Products tape heads. the full range of which remains unchanged.

RETAIL PRICE LIST.

Ultron 15, 15T 15L (Record-play high impedance, extreme range .00017" gap)	£9 13 6
Ultron 15H, 15HT, 15HL (Medium impedance, extreme range .00017" gap)	£9 13 6
Ultron 15S, 15ST, 15SL (High efficiency record, .00025" gap)	£9 13 6
HE2, HE2T (Record-play, commercial quality .0002" gap)	£6 3 0
EU, EUT, EUL (High efficiency erase)	£5 7 0
H4 (Record-play) and EH4 (Erase) Miniatures	£5 2 0

Note:— "T" denotes upper half track, "L" lower half track, all others full track. (Except H4 and EH4, which are half track.)
Send 4/- postal note for booklet "MAGNETIC TAPE HEADS" containing full details L.B. Products tape heads, hi-fi circuits, etc. A free copy with every head.

Available from:—Homecrafts Ltd., 290 Lonsdale St., MELBOURNE.
A. G. Healing Ltd., 58 Flinders St., ADELAIDE.
A. E. Harrold Ltd., 123-125 Charlotte St., BRISBANE.

Manufactured solely by:—

L. B. PRODUCTS

95 McDonald St., MORDIALLOC, S.12, VICTORIA. XY1596.

Making your own TV set?

Want the best?

You *MUST use an*

IRONCORE

POWER TRANSFORMER and CHOKE

THE LEADER IN QUALITY AND APPEARANCE

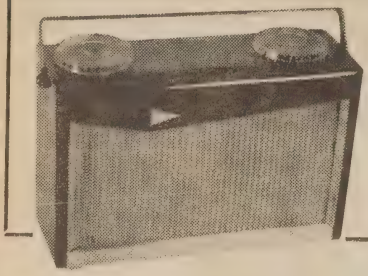
Obtainable from your regular supplier

IRONCORE TRANSFORMERS PTY. LTD.

HIGSON LANE, MELBOURNE, C.1.

TEL. MF4771

R.C.S. *Releases* LATEST PRINTED CIRCUITS



BUILD YOUR OWN TRANSISTOR PORTABLE RADIO—
THIS WAY IT'S SIMPLE!
RESULTS ARE GUARANTEED!
— YOU CAN'T GO WRONG!

TRANSISTOR PORTABLE COILS

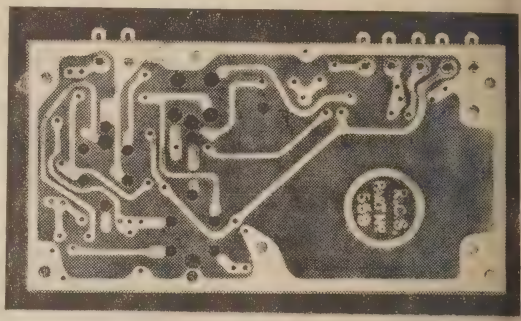
Part No. 560 Transistor Large Portable Kit

Consists of

- Part No. 558 Printed Circuit
- Part No. 559 Printed Circuit.
- Aer. Coil Part No. 248.
- Converter Coil Part No. 174.
- 1st IF Trans. Part No. 174.
- 2nd IF Trans. Part No. 175.
- Assembled and pre-aligned list of parts and circuit instruction.

Price £3/16/- plus tax

(You save 8/- by buying the complete kit)



COMPONENT POSITIONS PRINTED ON ONE SIDE — CIRCUIT ON OTHER SIDE!

TRANSISTOR PORTABLE COILS

Pre-aligned and tested.

Converter Coil	Part No. 249	7/4 plus tax
Aerial Coil	Part No. 248	14/- plus tax
1st IF Transformer	Part No. 174	11/4 plus tax
2nd IF Transformer	Part No. 175	11/4 plus tax

R.C.S. PRINTED CIRCUITS TO SUIT TRANSISTOR PORTABLE

Part No. 558 Printed circuit 400 m.w. audio amplifier portable. 20/- plus tax.

Part No. 559 R.F. printed circuit section portable 20/- plus tax.

Beautiful polished Cabinet and dial available

R.C.S. RADIO PTY. LTD.

651 FOREST ROAD, BEXLEY, N.S.W.
LW3491–5385

SOLE FACTORY REPRESENTATIVE—VICTORIA
Distributors Corporation Pty. Ltd.
403 Bourke St., Melbourne. MU3908.

: Recording Handbook," published Newnes.

wo of the best chapters in "Elements Tape Recorder Circuits" are those oted to equalising circuits. These oters discuss very fully N.A.R.T.B. dards, which for practical purposes equivalent to the international .I.R. recommendations adopted by ing British manufacturers.

he authors also build up a clear pic- of why the requirements of wide uency response, low distortion and signal-to-noise ratio are mutually flicting in magnetic recording.

ltogether the book is an interesting useful addition to any technical or teur's library. (A.W.)

UND ENCYCLOPEDIA

IIGH QUALITY SOUND REPRO-CTION, by James Moir, M.I.E.E. lished by Chapman and Hall, Lon-. Hard cover, 591 pages, 9in by 5¼in, strated by numerous photographs, drawings and circuit diagrams.

ublished for the first time this year, book attempts to cover the entire io field in 19 chapters.

There would be few advanced en-iasts or engineers who would not rn something from the information ween its covers.

Early chapters discuss the characteris- of sound, human hearing and the re-on of these to electrical reproducing tems. A chapter deals with micro-nes after which the electrical aspects sound reproduction through to the dspeaker are dealt with in logical er.

n the case of items such as speakers l microphones, external electrical and chanical characteristics are considered ner than the internal details which are concern of a few specialists.

The two concluding chapters deal re-ctively with "Sound Reproduction in Cinema" and "Stereophonic Sound production." The latter is of parti-ar interest at the present time. There a number of points about the re-irements of stereo reproduction which the subject of disagreement in gineering circles and the author is eful to include a number of opinions d quote their source.

A list of references will assist those thing to read in detail on one parti-lar aspect of the subject, while a thematical appendices to certain chap-s solve the problem of providing antitative information without making book too difficult for the general ader. It is a splendid publication.

Our copy from the Technical Book d Magazine Co., 295 Swanston Street, elbourne. The Australian price is 5/1/ plus 4/ registered postage. .V.F.)

THOSE BACK NUMBERS.

Back numbers of our magazine are extremely hard to find after a few months, particularly those carrying specialised technical articles.

The Technical Book and Magazine Company, 295 Swanston St., Melbourne, makes a feature of their collection of back issues, and can often supply them when no longer obtainable elsewhere.

Readers could probably save themselves some footwear by remembering this.

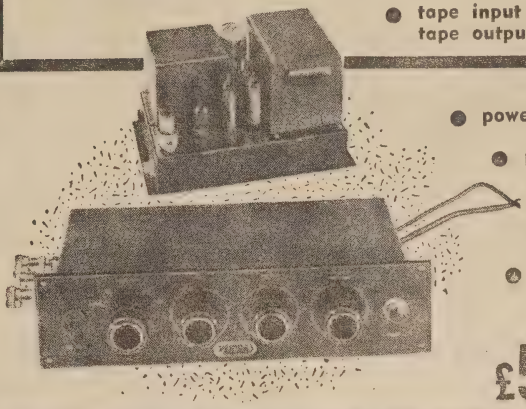
THE NEW ULTRA-LINEAR

VERDIK

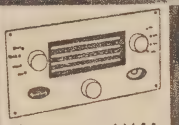
10 WATT AMPLIFIER & PREAMPLIFIER

with grain-orientated core transformers

- tape input and tape output
- power amplifier
- point one per cent distortion at 10 watts.
- preamplifier using EF86.



£52/10



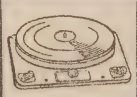
Armstrong AM44 tuner. All wave with variable bandwidth. £42/10/-

Armstrong selecto-matic preamplifier.

Armstrong power amplifier delivering 20 watts peak with EL 34's.

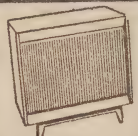
COMPLETE £84/10/-.

RCA Orthophonic amplifier and preamplifier, £139/10/-.

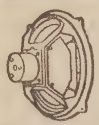


Garrard 301 turntables C.E.C. turntables

Altec and Wharfedale corner enclosures. £42/10/-

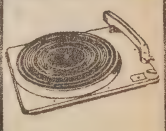


Enclosure Kits fully assembled ready for painting or polishing. £15/15/-



Wharfedale super 12 in FSAL speakers.

Barker Duode loud-speakers



Lenco transcription turntables.

HI-FIDELITY SALES

158 Clarence Street, Sydney. BX5127.

A TV SET YOU

Two versions of the latest R. T. & H. desig

● *Standard Kit for the Experienced* ● *Prefab Kit for the Beginner*

In response to the many enquiries received for a beginner's version of the "R. T. & H." Set, we present this simplified version of the latest circuit as an addition to our existing range of TV units.

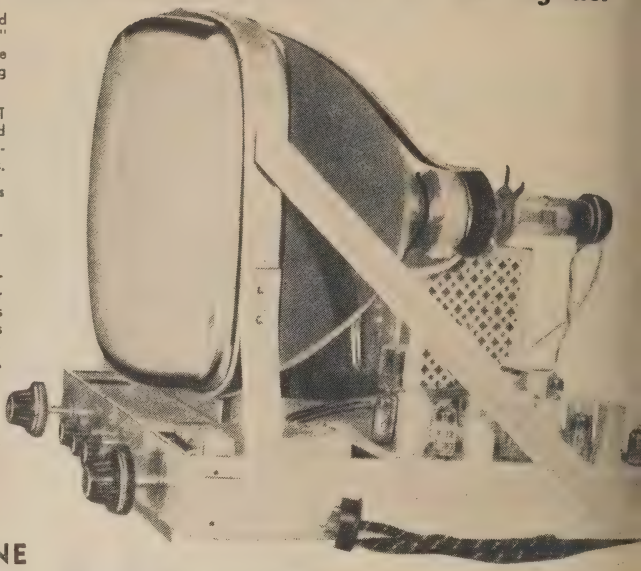
All intricate sections, such as IF strip, EHT section, commercial tuner, etc. are assembled and wired. Resistors and condensers are already mounted and wired to mounting panels.

You have only to mount the main components and make a few soldered connections.

There is a big, profusely illustrated instruction book supplied with each kit.

The average handyman, spending an hour or so at night, can make his own 17" or 21" set in less than a week. Sample chassis is on view at our premises. Each kit includes only first-grade branded components. Complete with all valves and the AWA 17 AVP4A or 21 ALP4B picture tube. The IF's are Q+, using the latest "R.T. & H." IF strip circuit.

The ready-drilled chassis is first cadmium plated, then passivated to avoid fingermarks. Tuner is Philips, and deflection components AWA. The whole project is essentially one where quality of design, materials and craftsmanship are dominant.



NOW ALMOST ANYONE CAN MAKE HIS OWN TELEVISION SET !

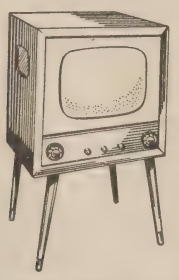
If you're interested in owning a TV set, with a saving of £100 or more, send coupon NOW for full details.

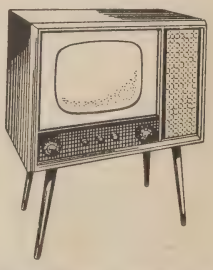
STANDARD KITS FOR THE EXPERIENCED

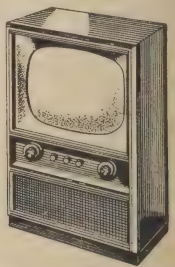
Complete kits for the technician and hobbyist with some experience are readily available. These kits are complete in every detail to suit the latest R.T. & H. Circuit. You carry out all assembly and wiring as described by "R.T. and H."

OUR CHECKING AND ALIGNM
SERVICE GUARANTEES
FIRST-CLASS RESULTS

Clients are GUARANTEED a first-class pic
The moment you purchase an E.P. kit, e
simplified or standard, we guarantee to see
through with the job to a successful conclu
Our technical advisory service is availabl
you. When you have completed your w
we will check and align your set; making
tain that you receive a first-class picture.







THREE BEAUTIFUL CABINET DESIGNS

For those who prefer to buy a ready-made cabinet we h
produced three very fine cabinets as illustrated.

SEND COUPON NOW FOR FULL DETAILS

TO ELECTRONIC PARTS PTY. LTD.

Dear Sirs,

Please mail me free literature on TV kits.

NAME .....

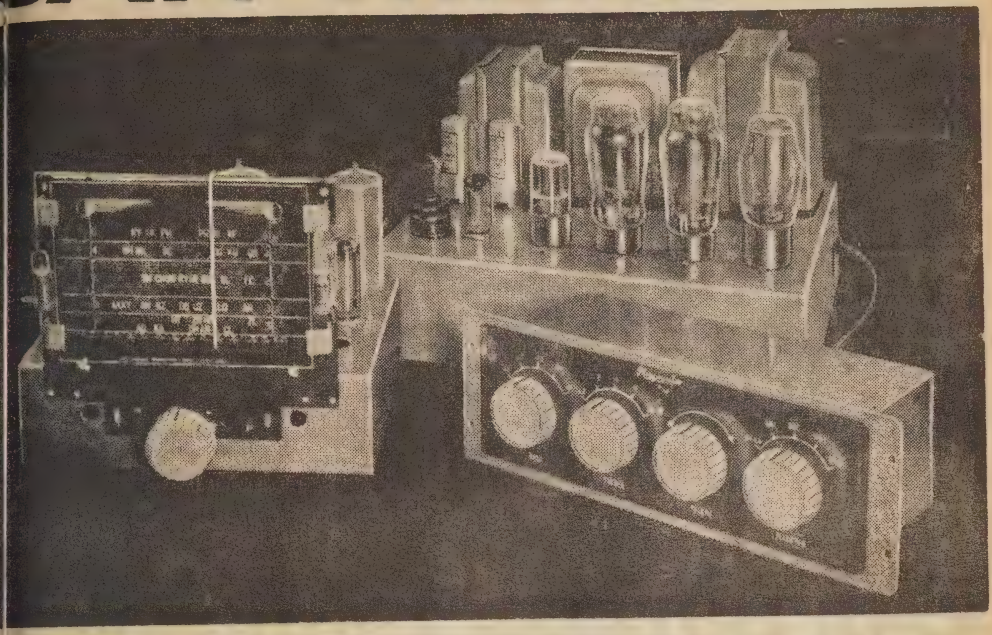
ADDRESS .....

.....

ELECTRONIC

E. S. & A. BANK BUILDING (opp. Grace Bros. B'wa

CAN MAKE . . . .



Build your own Hi-Fi outfit!

PLAYMASTER HIGH FIDELITY AMPLIFIERS TUNERS CONTROL UNITS

igned by "Radio, Television and Hobbies" this high-
le equipment offers combinations of units to suit every
uirement. Quality of reproduction on performance and
res is amazing. Futhermore, the cost is much lower
that of similar powered imported units. If you
er to build your own hi-fi gear, we can supply the kit
parts containing precisely the same high-grade com-
ents as are used in the completely built unit.
range includes high quality amplifiers from 20 watts
watts, control units, and a complete range of tuners
luding the latest F.M. tuner). You are invited to
e, phone or call for illustrated descriptive catalogue.

THE HI-FI SPECIALISTS

E. S. & A. BANK BUILDING
(opp. Grace Bros.)
Corner of Broadway & City Rd.,
Sydney. N.S.W. PHONE BA4893

PARTS Pty. Ltd.

SPECIAL! **A COMPLETE HIGH-GRADE PLAYMASTER OUTFIT FOR UNDER £50**

If you are keen to obtain hi-fidelity reproduction, something much better than could be expected from even the more expensive radiograms, this genuine hi-fi outfit will appeal to you. It comprises Playmaster 5/6 watt-amplifier (available as a kit or completely built), the sensational Magnavox 12 WR twin cone speaker and latest Dual record player. Operated from a suitably designed cabinet, it gives truly superior quality reproduction of your recordings. Send now for Playmaster catalogue.

Send for details NOW
TO ELECTRONIC PARTS PTY. LTD.

Dear Sirs,
Please mail me your free catalogue describing Playmaster Hi-Fi equipment.

NAME .....

ADDRESS .....

.....

Let's Buy An Argument

The other day I was checking through the daily pile of mail, when one letter in particula caught my eye, along with an eight-word reply, which had been appended by the staff membe who happened to deal with it. I felt that both letter and reply were too good to pass over

First of all, I won't risk spoiling the letter by writing it into the general body of the text. It is set out exactly as received on the opposite page. I suggest that you tear your unwilling eyes away from these words right now and read it—the first of the two letters.

You've read it?

Good.

When I came across it, the letter had been re-typed for inclusion in the "Answers To Correspondents" page, along with the aforementioned reply.

WHAT ABOUT STEREO?

This last simply said; "Have you read our latest articles on stereo?"

Eight words but with so much implicit meaning.

The point of view put forward by "Cassandra," a self-imposed nom-de-plume, is not by any means new. It comes merely as a kind of climactic summation of ideas, requests and pleas which have been entered from time to time for bigger and better control units.

In a way, I suppose I must accept responsibility for having sponsored some of them.

Way back, when most people were thinking in terms of grandiose radiogram chassis, I dreamed up and described a control unit, containing a Function Switch, Volume Control, Bass Up-And-Down Control, Treble Likewise. It fed into a separate basic amplifier, exactly as per modern practice.

That was only the beginning. When the first wide-range speakers came to hand, with their ability to reveal — and generate — high frequency distortion components, I duly produced an adjustable top-cut filter, which added another knob, to the consternation of other members of the family!

Those five knobs looked quite imposing and enabled me to present each new disc as a kind of joint performance!

by Neville Williams

Then came the FFRR and crogroove recordings, with their of recording characteristics and implicit invitation to add a much and better Function Switch.

The same circumstances, of produced a race of R.C.D's (Rec Characteristic Detectives) most of have since been incarcerated, su from Delirium Frustratum.

Nor did the matter end there content with trying to match every of the recording engineer, real imaginary, audio designers have dreamed up correction and filte cuits aimed at extracting the last musical information out of the crackle, hum and boomp, which from old records, poor records, motors, poor anything.

For each new function, a new

NOT RIDICULE

This might seem like pure ri but it isn't intended as such. audiophile worthy of the name ha the challenge of contrary condition fascination of all the extra fac the desire to try this and try that.

What's more, there was a period it all seemed so very necessary. N play the cherished old 78's was unt able. Motors did suffer so much rumble, pickups and speakers from ful peaks. But things have changed during the past couple of years.

Record lovers, or the majority them, have written off their old except for reference purposes. They accepted the fact that they are and limited in their range and may as well be played with the same of top cut as ordinary microgrooves

What's more, the microgrooves th selves have gravitated towards the s dard RIAA curve, so that the need a whole host of alternative characte tics has diminished.

TOWARDS SIMPLICITY

People who sell amplifiers or the to build them tell us that the trend, quite some time, has been towards s pler equipment with a "Pickup-Ra switch, "Volume," "Bass" and "Treb nothing more. It is selected to sui crystal or magnetic type pickup, as quired, and supplied with a spea system of commensurate quality price.

In other words, and in a general se the trend has been away from compl

and all the strivings to get the most
n old and faulty records. The public
buy or have bought enough records
consistent balance and quiet sur-
is to have lost interest in anything
h else.

nd lest we brand the average audio
usiast as a moron for his simple
roach, let us remember that his sim-
approach gives him much better qual-
than the most diligent audiophile
ld achieve a very short time ago, for
his pains.

Many people in the audio business
e seen the above trend as one towards
ibility."

"Cassandra" thinks otherwise. He says
i-fi is in a rut" and suggests a formula
extracting it therefrom.

Without taking sides on the issue, I
only suggest that the trend towards
plicity must be boosted enormously
the impending introduction of the
reo system. It is one thing to give
n to ingenuity in contriving a single
nnel. It is quite another to double up
everything for twin channels.

WO OF EVERYTHING

Even the specification "two off" for a
mple" system adds up to a fair amount
gear. Customer reaction to stereo is
ry solidly along the lines "How sim-
can I make it?"

Is this a bad thing? Not necessarily.

If recording companies follow the pol-
of uniform standards, there should
no need for elaborate adjustments
r balance. A little more or less of bass
d treble should be enough to com-
nsate for individual listener pref-
ence.

I doubt if anyone will make a fortune
ying to sell more facilities than these.

In fact, I am prepared to find that
e introduction of stereo will change a
t of our preconceived ideas about bal-
nce and what is or is not necessary for
tisfying reproduction.

Many such ideas, possibly false ideas,
ay have grown from our long-term
forts to coax from a monaural channel
mething which it is fundamentally un-
ble to give. All this time we have been
ying to achieve by amplitude control
separation which is fundamentally one
f space.

Once the space factor is restored by
ereo, even in part, we may find that
any of the recordists' tricks of mic.
lacement and our own tricks of fiddling
ith balance become redundant. In fact,
ey may only render the end result
rotesque.

ENOUGH JUST HERE

More than this I don't want to say
ast now because it may be doubling
p on discussion elsewhere in the maga-
ine.

But let me say this, that stereo-on-
lisc is going to turn the whole audio
usiness upside down, whether we re-
ard its former state as one of stability
r stagnation.

It's going to change our concepts of
omestic listening, our ideas about bal-
nce and distortion and what-not—and
our ideas about amplifier design.

Even without stereo, I would have
rated Cassandra's ideas as unreal and ex-
aggerated. With stereo, they would result in a monster sufficient to embarrass Heath Robinson himself.

No Cassandra, we're not in the market!

Just to round off this little discussion I feel that I must quote a letter received some time back from a correspondent in Western Australia. It so neatly puts the opposite point of view.

Enclosed with the letter was a pencilled diagram of the correspondent's own Control Unit involving seven distinct valve functions. Since our draughtsman doesn't have a week to spare, no attempt has been made to reproduce it.

Apparently C.H. made the thing work well enough but the interesting part, for our present purpose, is not the circuit but his reactions to the finished device.

The letter is quoted above, exactly as received. I suggest you read it.

I can well imagine a visitor walking into the homes of either of these gentlemen and being taken aback by the array of knobs on the amplifier.

Question: What on earth is that?

Answer: Wurl-itz-a control unit.

TWO IDEAS ON CONTROL UNITS

BIGGER AND BETTER!

Dear Sir,

For years now you have designed preamplifiers with the minimum of complication but I suggest that this approach is now out of date I suggest that you should design a really complicated preamplifier.

For example, the knobs could run:-

1. *Input sensitivity.*
2. *Twelve positions of compensation.*
3. *Extreme Bass.*
4. *Low Mid Range.*
5. *High Mid Range.*
6. *Extreme Treble.*
7. *Bass Roll Off Point.*
8. *Bass Roll Off Slope.*
9. *Treble Roll Off Point.*
10. *Treble Roll Off Slope.*
11. *Loudness Control.*

Except for the compensation switch all controls should be continuously variable to allow fine adjustments, and the tone controls should allow rather more boost than cut, say two to one. Naturally, a few valves will be used, but with small components the size can be quite small, say 4in x 12in face and 4in deep. It should be built on a steel front plate with the valves on brackets and a box back.

Such a preamplifier would permit full control of reproduction and besides, not even an American Hi-Fi shop could show you something competitive.

Yours,
"Casandra".

P.S. I am quite serious about this. Hi-Fi is in a rut.

"HORRIBLE EXAMPLE"

Dear Sir,

If ever a prize were awarded for the most idiotically over-complicated pre-amplifier I feel that I might at least be in the running with the circuit diagram I am enclosing. I offer it to you as a horrible example of how one's brain-child can run away with one.

This particular unit started, believe it or not, as a simple single-valve pre-amplifier with the simplest of tone-controls. Like Topsy, however, it has "Just growed". It now occupies a box two feet long with a single row of thirteen knobs and five push-buttons underneath.

Every stage has feedback around it for one reason or another so that overall gain is not very high in spite of the seven stages, and distortion is negligible.

The first stage is a low-level pre-amplifier with variable feedback controlled by a potentiometer connected "back-to-front" for better grading.

This is followed by a feedback type compensation stage which gives a variety of bass turn-over and roll-off frequencies controlled by S2 and S3 (closing S3 changes the characteristics given by S2).

The five push-buttons, any combination of which can be pushed together, give a variety of roll-off frequencies and also allow steps to be put in the roll-off response at very high frequencies (by introducing the resistors in series with the capacitors) for use with some odd discs where treble pre-emphasis flattens out at those frequencies.

Following this stage is the volume control which feeds an inverter stage and frequency-selective networks (with pots) which in turn feed bass and treble boosting stages (V4).

Bass cut can be operated at the output of the inverter by opening S4 and treble cut by closing S5. The outputs of V3 and V4 are summed at the grid of V5 and allow quite wide control of tone to be obtained.

Bass cut and treble cut are varied by switching the cut controls and varying the boost controls. In practice I have not found this to result in any undue lumpiness of response.

V6 following provides a continuously variable sharp-cut filter using parallel-T networks which can be switched right out when not required by using S7.

The last stage is a four-position sharp-cut bass filter, based on a circuit by Baxandall.

All of which merely shows, no doubt, to what lengths human folly can go.

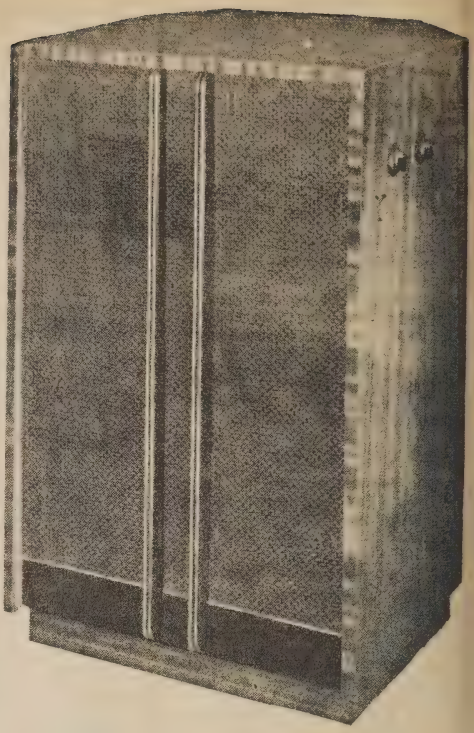
Having created my Frankenstein and spent many hours labouring to track noisy resistors, faulty valve sockets and intermittent switch contacts. I am quite sure that if someone were accidently to put his foot through the monster I should never bother to rebuild it.

I should merely build once again the original single-valve job (even if it didn't have the ability to make my visitors' eyes pop!).

Yours faithfully,
C. H., WESTERN AUSTRALIA.

Goodmans

'325' *reproducer*

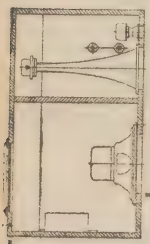


FULLY IMPORTED COMPLETE MULTI-UNIT HI-FI SPEAKER SYSTEM NOW AVAILABLE

No compromises whatsoever have been adopted in the design of the Goodmans '325.' Each component is the result of exhaustive development aimed at producing an integrated system which provides the utmost accuracy of High Fidelity sound reproduction.

The '325' contains 3 speaker units: 12" direct radiator type bass unit which operates from 30 c/s to 750 c/s; pressure type mid-range unit operating from 750 c/s to 5K c/s; pressure type treble unit operating from 5K c/s to 16K c/s. The mid-range and treble units are provided with variable constant impedance attenuators, externally operated. Network XO 750/5000.

When using the Audium 60 as the bass unit, the reproducer is known as the '315'; when using the Audium 70, the '320'; and when using the Audium 80, the '325.'



The enclosure is internally divided into two parts: the upper portion containing the treble and mid-range units and their attenuators; the lower portion containing the bass unit loaded by an Acoustical Resistance Unit in the rear wall of the chamber.

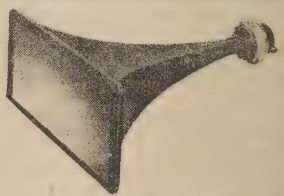
AUDIUM BASS LOUDSPEAKERS

AUDIUM 80

	AUDIUM 60	AUDIUM 70	AUDIUM 80
Flux Density	14,000 GAUSS	17,500 GAUSS	14,500 GAUSS
Bass Resonance	35 c.p.s.	35 c.p.s.	35 c.p.s.
Power Handling Capacity	15 watts	20 watts	25 watts
Impedance at 400 c.p.s.	15 ohms	15 ohms	15 ohms

TREBAX HIGH FREQUENCY PRESSURE UNIT

Frequency Range	2,500 c.p.s. to 16,000 c.p.s.
Impedance	15 ohms at 10 Kc/s
System Power Handling Capacity	25 watts
Crossover Frequency	5 Kc/s



MIDAX MID-RANGE PRESSURE-DRIVEN HORN UNIT

Frequency Range	400 c.p.s. to 8 Kc/s
Impedance	15 ohms at 400 c.p.s.
System Power Handling Capacity	25 watts
Crossover Frequency	750 c.p.s. and 5,000 c.p.s.

Australian Agent:

BRITISH MERCHANDISING PTY. LTD.

Box 3456, G.P.O., SYDNEY

BRITISH MERCHANDISING PTY. LTD.
Box 3456, G.P.O., SYDNEY

Please send a copy of GOODMANS "High Fidelity Loudspeaker Manual" to:

Name .....

Address .....

..... RH/8/58

CASSANDRA HAS ANOTHER SAY:

Dear Mr. Williams,

Thank you for your letter and—you for your intolerable insolence. I most emphatically do not regard my ideas as "extravagant and unnecessary for a single channel and quite impractical for a stereo system."

Well . . . not very extravagant, anyway!

The letter and circuit you enclosed were very interesting and I am returning them in the hope that you will print them for the benefit of other trail blazers. After all, your correspondent has been less than just to himself by comparing himself to Frankenstein and his preamplifier to a monster. (Will it really slaughter the neighbourhood?)

I feel that he gives the clues to his problem when he says "like Topsy" is has "just growed."

The circuit lacks unity. It requires streamlining, as a natural outcome of doing the job in fits and starts. I am sure that, if he set out to design the job again as a whole it would be simpler, more efficient and still as flexible. For example, there seems to be too many feedback loops.

MUCH TROUBLE?

He gives the impression that he had a lot of teething trouble and possibly this was caused by patchy layout and commercial quality components. These jobs must be done with rigorous layout and the finest components, with fine tolerances, heavy wiring and open wiring runs.

He leads me to propose yet another knob for my projected preamplifier, namely separate control of the bass and treble portions of the compensation curves, so that one could switch in, say, a 78 bass and an AES treble.

Your remarks about stereo bring me to another subject.

I have so far never got around to joining the Audio Society and thus missed the stereo demonstrations. I thus know nothing about the subject whatever. I confidently predict that stereo is a waste of time and money.

THOSE TRAINS AGAIN!

No doubt, it is just too fascinating to have trains running around the living room, but I prefer organ and string music. Would it be uncharitable to predict that, musically, Handel's Organ Concerto in stereo would be the fizzer of the season?

Stereo is a vicious plot to load up the Hi-Fi addict with twice as much junk, and shows that the manufacturers, crazed with the blood lust for power over us, will stick at nothing.

Finally, you will no doubt appreciate the classical allusion in my pseudonym. Cassandra was cursed with a gift of prophecy to which no one would pay any attention. But I am in a prophetic mood, so here goes:

One day a prophet will arise and, with a flourish, unveil the very latest output valves. They will be enormous triodes operating in pure class-A push-pull and will require an enormous rectifier valve and transformer and choke, at which no one will boggle for a moment.

Enormous quantities of feedback will be used and the results will be slightly better than our present ultra-linear amplifiers. And the whole thing will be suspiciously like 2A3's in push-pull parallel.

But I must close now. The Philistines are about to beat the door down and I must make my getaway.

Yours faithfully,
Cassandra.

nd now the sequel.

ormally the sequel to any batch of espondence and comment through e columns has appear in a subsent issue, for fairly obvious reasons. s is one occasion where it can be uded in the same issue.

t is possible because, having typed foregoing material for inclusion in e columns, I also replied to Cassan-, acknowledging his first letter and ely remarking that I considered his as extravagant and unnecessary, etc.

Now, Cassandra is obviously a man o doesn't like having his pet ideas nded in such terms. He'll forgo din-, television and even his beloved mon-al Handel to compose a letter of pro-ation and see it deposited forthwith the local mail box.

That's why it caught this issue, with s to spare!

Cassandra, I feel, has rather relished opportunity to "tell me off," but it done with such a delicately balanced mixture of exaggeration and good mour that one could not possibly take ence.

LWAYS PLEASANT

Like a gentleman thug I once heard out, who would never rob a woman thout first smiling and raising his hat!

Not that I mind being told off. An verse word now and again is a good ing. It clears the air, it breaks up e development of complacency and akes one appreciate the more those nes when adverse words are not being oken.

Having thus said, I'm afraid I can only peat (perhaps sadly) that Cassandra's eas are unnecessary, unwarranted, in-pable of practical justification, extrava-nt, extreme to the point of obsession, d not likely to be adopted, other than persons suffering equivalent orders of session.

The sad note arises simply from the ct that, in trying to help Cassandra, I ve succeeded only in suggesting yet nother function for his Control Unit. I re not exploit further the line of ar-ument commonly known as "reducto l absurdum," lest it should merely feed s insatiable appetite for knobs and ings to do with them.

Another sad feature of Cassandra's se is the chronic inconsistency of his hole outlook.

He talks quite happily about piling mplication upon complication at the ont end of his amplifier and would resumably be first in the queue to buy ese enormous output triodes, complete ith transformer, rectifier and choke to atch.

He even invites us to feed him with leas and data and expresses the hope hat other readers would likewise become nterested. Those who might respond ecome "trail blazers."

But when the same Editor, the same ournal, the same industry suggests ela-oration along some other line, they be-ome deviationists, they "load the Hi-i addict with junk," and are "crazed vith blood lust."

Is there is psychiatrist in the house? Or a psychologist?

I am not quite sure where one would ook for the mortal remains of the origi-al Cassandra, or even whether such re-nains are safely ensconced in a tomb.

But, if they are, I fear they must be turning over and over in approved fashion at the kind of prophecy issued by her pseudonomic disciple. Not about the big triodes—you can probably buy them already, in one form or another, from among industrial or transmitting types.

I refer to stereo reproduction and our correspondent's apparent idea that its application is confined to gimmick sounds. There are few things that I'd like to hear more than an organ concerto in stereo, with dimension helping to sort out the tremendous conglomeration of sound which currently has to issue from one source.

After all, grand organs themselves occupy a fair sort of frontal area and give the directive qualities of our ears and brain plenty of exercise.

But, then, of course, Cassandra ventures a very strong opinion, hard on the heels of his explanation that he knows "nothing about the subject whatever"!

But, woe! There goes the original Cassandra again, whirling around in her grave like a longitudinal top. I must stop this or the poor old soul won't get a moment's rest!

Just to round things off, I quote from a letter from B.S. in Queensland. Commenting on our remarks some time back about exaggerated or misleading TV advertisements, he points out that there is ample precedent from the early days of radio.

He mentions an advertisement in a copy of the libretto of "Fidelio," as presented by the B.B.C. in March, 1927.

It describes the virtues of a then current brand of radio valves:

"They bring the music nearer,
They make the music clearer,
And yet they are no dearer."

". . . valves are valves of sheer musical virtuosity. Sure, exquisitely sensitive and sympathetic, they give your set a new soul.

"They are wonderful musicians, these . . . valves and keep their youth, knowing no fatigue.

"From electrical dealers everywhere."

An advertisement for a loudspeaker claims it to be "a loudspeaker of distinction, which definitely improves with age."

Says our correspondent, "It ought to be pretty good by now."

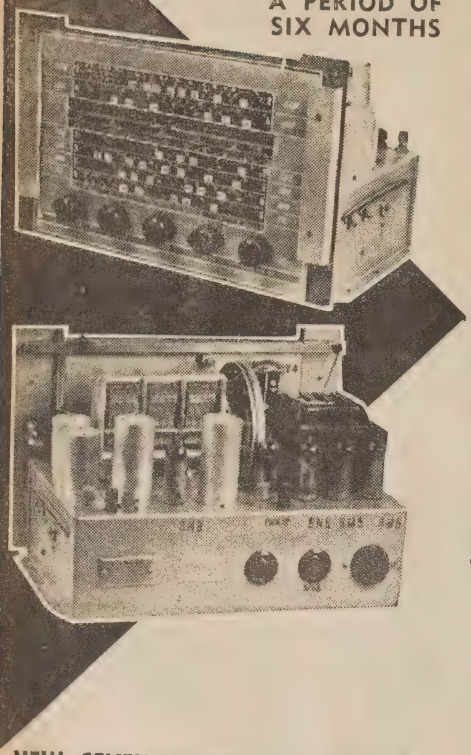
before purchasing your radio see our

Hi-Fidelity

RANGE

and compare these NEW features.

ALL CHASSIS GUARANTEED FOR A PERIOD OF SIX MONTHS



NEW:

Ultramodern circuit using nine high gain valves including "magic eye" ti indicator. Permatuned iron cored coils and intermediates giving excellent s state reception and a short wave range of 12,000 miles. All valves used the new Mullard nine pin Innoval series.

NEW:

Tone control and audio stages incorporating the Mullard 5/10 amplifier ci with separate bass and treble controls giving plus or minus 15 db boost or at 50 cycles L.F. and 10,000 H.F., combined with push-pull output with in feed-back gives you really high fidelity reproduction from your radio or favo recordings.

NEW:

Dual Speaker combination, using a heavy duty woofer (12in M.S.P. Jensen A special) with matching 6in tweeter and cross-over network giving a freque response of 46 to 13,000 cycles. Speakers are mounted coaxially making one 11in mounting hole necessary.

NEW:

If required the new Magnavox high-fidelity twin coned speaker can be suppl Large calibrated edge-lit dial in plate glass (11in x 7in) with main stations each State in prominent type. Dial fitted with counterweight drive, giving sm tuning. Indicator lights are fitted showing which band is in operation. can be supplied in cream, black or brown with matching knobs and escutch to suit contemporary blond or walnut finished cabinets.

NEW:

Sensitive "magic eye" tuning indicator (EM80) making tuning simple and p tive even on interstate, overseas and country stations.
All chassis are wired for the fitting of F.M. tuner or tape recorder, spe plug being provided on back of chassis, also pick-up terminals and outlet gramo motor.
Power switch is fitted to volume control, radiogram switch, combined with w change switch. Audio end of set can be used with TV receiver if required.

A NINE VALVE HIGH-FIDELITY RADIOGRAM CHASSIS

Nine and ten valve chassis incorporate the Mullard 5-10 AMPLIFIER CIRCUIT. Frequency response 40-13,000 cycles Max output 10 watts.

£41/15/(

F.O.R.

A NEW 10 VALVE DUAL WAVE RADIOGRAM CHASSIS

WITH BASS AND TREBLE BOOST

The ideal chassis for those difficult locations where reception is doubtful. Specifications are nine valve unit, but with the addition of high gain tuned R.F. stage giving greater sensitivity and selectivity on both broadcast and short wave bands.

£44/15/(

F.O.R.

NEW SEVEN-VALVE HI-FI CHASSIS

This new compact dual wave seven-valve chassis uses the same tuner circuit as our 9-valve unit with the Mullard tone-control circuit giving separate bass and treble controls. Push-pull output using two of the new 6BM8 dual purpose output valves and heavy duty M.S.P speaker.

£31/15/- F.O.R. PACKING 10/ EXTRA

Also available with Magnavox 12W.R. Hi-Fi speaker and Ferguson output transformer at £4/15/ extra.

Write for full specifications

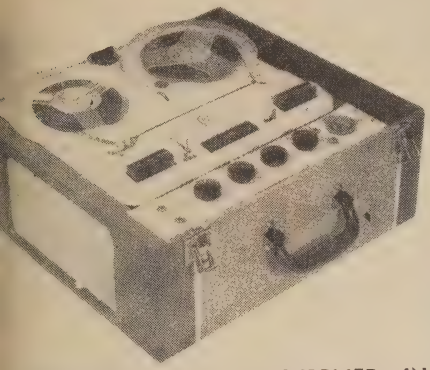
ALL 4 SPEED RECORD CHANGERS AND PLAYERS STOCKED

Classic Radio

245 PARRAMATTA ROAD, HABERFIELD, N.S.W. PHONE UA2145

uying a Tape Recorder?

rst see and hear the new Hi-Fi Recorder by Classic incorporating the v Collaro Mark IV Transcription deck. The only deck with ALL these features.



E COMPLETE UNIT IS SUPPLIED IN TRACTIVE AND DURABLE TWO-TONE ASTIC COVERED CASE COMPLETE WITH ACOS MICROPHONE

six-valve amplifier incorporates the latest "Mullard" recorder circuit equalised to C.C.R standards giving ect reproduction from recorded tapes Record monitor and outlet to power amplifier. Extension speaker out and "magic eye" level indicator. Amplifier is com ly shielded and fitted with perspex dress plate to match

- **HIGH FIDELITY**
  Heads are double coil wound and will reproduce up to 12,000 c.p.s. at 7½ inches per second. Azimuth adjustments on both impedance "record" and "playback" heads. Output of heads is approximately 5 milli-volts at 1 Kc at 7½ inches per second.
- **INSTANTLY REVERSIBLE**
  Instantaneous changes can be made from one track to the other. Fast rewind in either direction.
- **CONSTANT TAPE TENSION**
  A special Collaro device ensures a constant tension on the tape on the take-up spool as it leaves the capstan.
- **FULLY MECHANICAL**
  No solenoids are used in the construction of this Transcriptor. The braking is entirely mechanical.
- **FINISH**
  Cream Polystrene cover plate with maroon controls.
- **THREE SPEEDS**
  3¾, 7½ and 15 inches per second.
- **FOUR HEADS**
  Two "Record/Play-back" and two "Erase" heads are sited on two different levels and head wear thus halves for any given length of track.
- **TWIN TRACK OPERATION**
  One pair of heads for each track. Both top and bottom tracks can be recorded or played back without removing tape.
- **PAUSE CONTROL**
  This has the effect of stopping the transit of the tape past the "Record/Playback" and "Erase" heads and applying the brakes to the spools while leaving all switches and mechanical functions in their selected positions. Typical application is to pause whilst recording to omit speech interposed between musical selections. Control will only work whilst it is held in position.
- **TAPE MEASURING & CALIBRATING DEVICE**
  The three digit counter makes the location of any recorded passage the simplest of operations.
- **TRANSCRIPTION TECHNIQUE**
  A large diameter flywheel with ground and lapped steel shaft running on a ball at the bottom of long bearing reduces friction and virtually eliminates "wow" and flutter at less than 0.15 to 1.0 per cent.
- **TWO MOTORS**
  Each dynamically balanced motor does only one job at a time. Motors never act against each other and are of low wattage input with consequent reduction in heat and wear.

OMPLETE RECORDER WITH MIKE—80 GNS. f.o.r.

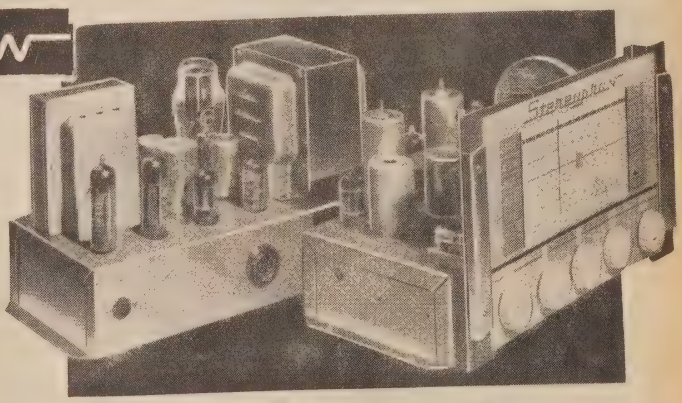
CK WITH AMPLIFIER, POWER SUPPLY and 6in x 9in SPEAKER, 70 GNS.

Stereophon

— LIVING SOUND —

compact 11-Valve gh-grade Radio- m in two chassis turing a variable d - width Tuner. lti-input preampli- and Tone Con- l in one unit and 0-Watt Ultra-linear plifier. Ideally ted for use with gh-grade pick - ups l speakers.

65 GNS. F.O.R.



Classic Radio

245 PARRAMATTA ROAD, HABERFIELD, N.S.W. PHONE UA2145

OFF THE RECORD — NEWS & REVIEWS

It's going to be impossible to make any worthwhile comments for a few months without co centrating on stereo because it is virtually monopolising recording activity on both sides the Atlantic. I wouldn't be surprised if, by the time next month comes around, both recor and equipment will be on sale in Australia. It might even happen before this issue hits t bookstalls.

by John Moyle

IN U.S.A. stereo has broken out in many places, and includes the large companies as well as the small.

While a large proportion of the industry is being cautious in its statements on the stereo future, it is obvious that most consider it will be entrenched before long as the standard type of disc.

Virtually all equipment issued by the top names such as RCA, Columbia, Philco etc. uses a stereo pick-up, and the purchaser can please himself whether he uses it for stereo or not.

An illustration in these pages shows a popular set-up which allows the buyer initially to acquire a radiogram in a single cabinet, some with multiple speakers, and some with a single speaker, according to quality.

At a later date, or now if he wishes, he can buy an extra unit which allows him to plug in and have stereo. It is not clear in all cases whether the extra unit has its in-built amplifier, but there is little doubt that some types will.

On the score of compatability, all concerned have given away the idea that any monaural pick-ups, even of high quality, are suitable for playing stereo discs.

They are reconciled to the position that the vertical compliance just won't be good enough, and that the danger of ruined discs subsequently being adversely criticised when played stereo is far too great to encourage.

Ideas of compatability have shifted to the line that, once having fitted a stereo pick-up, you can play both types of discs with equal ease, and in many cases with better quality than before.

In general this is likely to be true, but it is also likely that a number of monaural discs won't sound so hot with the finer stylus, which will be .7 mil for all-round use.

It will depend on whether the groove accuracy of the monaural discs is good enough in all cases to allow the fine point to trace them successfully.

With the latest examples of mo discs, particularly those cut V-grooves, all will probably be w

But I feel there will be some won't sound the best.

The hi-fi fan isn't likely to be pe ed about this, for he can probab range either to retain both pick-u the turntable, or to use interchan heads just as he now does for 78s those who aren't really fussy, th terioration when lined up agains proportion of doubtful cases mi be very important.

★ ★ ★

Since writing the above paragra have received information which me to believe that the record comp might abandon compatability altog due no doubt to the problems the facing in trying to strike a compro

It is strongly rumoured that, whe British record companies come out their big releases in August, they recommend them to be played with mil stylus, and that the Americans follow suit.

Personally I think a decision to the .5 mil stylus, if it means b stereo, is a very wise one.

I have had private reservations a the ability of a larger point to be satisfactory on stereo, although th something that only experience can termine. Unless the stylus point is to sit well down into the groove it m well be almost thrown out of it u conditions which include a heavy ver component.

And it's pretty certain that the .5 point will do a better job of tracing groove, and with less distortion. We c afford to cut too many corners in regard with stereo, for the system herently has more distortion than straight lateral cut.

With a point as fine as this, ther little doubt that many old-type rec would be a complete write-off. It is possible that the best examples will playable. A V-groove, reasonably served during the process of manu ture, might sound very well.

But for everyday consumption wouldn't be optimistic about it.

If compatability has to be consider it would, I think, be better to prod a turn-over pickup which will play b stereo and monaural L.P.s, abandon altogether the 78 stylus.

Anyone who is up to regular diet stereo isn't likely to be very intere now in 78s. They are rapidly becom "vintage," for which special arrangeme should be made rather than for stere

We shouldn't be dismayed at this e dence of second and third thoughts ab stereo. It is far better to have th cleared up early in the piece, and should have a clearer picture on ma details in a few weeks or months.

audiocraft PTY. LTD.

SPECIALISTS IN ALL TYPES OF

CABINETS

FOR HI-FI EQUIPMENT

We manufacture a wide range of speaker enclosures and complete home Hi-Fi systems.

SHOWROOMS AND FACTORY: 82 GLENFERRIE RD., KEW E. 4 VIC.

PHONE WA 5559 At tram terminus. OPEN SATURDAYS

TAPE-TO-DISC

SERVICE

YOUR TAPE RECORDINGS COPIED TO DISC, LP OR STANDARD, SPEEDILY, AT LOWEST COST & HIGHEST ATTAINABLE RESULTS

Marco Recording Studio, pioneers in Australian tape-to-disc service, have the experience and know-how. Now, as a subsidiary of PLANET RECORDS (Aust.) first class results are assured.

Send stamp for full details and prices of this professional service to the public.

MARCO RECORDING STUDIO

A SUBSIDIARY OF PLANET RECORDS (AUST.)

13 AVENUE B, EASTERN MARKET BUILDING, MELBOURNE, C.1.

Telephone MF6099.

time will tell.
arted out to keep a list of USA firms who had gone into stereo, ealed by air-mailed newspaper cut- but they are now so numerous include virtually everybody.
expected, the smaller firms were on the trail, for they had least and everything to gain by bring- eir labels into the public eye. The arted out with Imperial, Savoy, anto, Seeco, Elektra, ABC Para-, Audio Fidelity, Urania, West- r, Vox, Counterpoint, Mercury, bia, Capitol and then I gave up. this time, at least 300 discs should sale.
ial reports from New York show the demand for them was very Many stores sold out initial orders were doubling up within a matter ys.
England, there is rather a vacuum moment, as the trade and the waits for the Trade Fair which is for August 27.

UST DEADLINE

t is the dead-line apparently for ge release of records and equip- and reports indicate that stereo dominate from then on.
is to be expected that the record e will be very cautious about what do and say for some time, for the d market is huge and big money volved in upsetting production and more than is necessary.
both England and America, where d playing units are numbered in millions, it takes quite an effort riously dent the main body.
ile the impact on the specialist near-specialist buyer is likely to be great, there will be a need to cater he laggards for some time to come spite this, record manufacturers be prepared for anything, no er how clearly the path may seem defined on a long-term basis. The nd for stereo could easily get away the capacity to supply.
the time next month's issue es around, I hope to have some lar production discs from here and , with a much clearer idea of how will perform on a steady basis.
will be a most pleasurable ex- nce.

ECORDS OF HE MONTH

PINZA RECITAL—Excerpts from lozart, Puccini, Rossini, Mous- rgsky, Verdi and Halevy, with rchestra. Coronet KLC 672.
TOZZI RECITAL—Excerpts from lozart and Verdi, with Orchestra. .C.A. L16122.
.C.A. suggests that Tozzi is the cal successor to Pinza now that the r is no longer with us.
hey may mean that he will be a re- ement in their recording lists, but an't agree that Tozzi, a fine singer, n equivalent to Pinza.
heir styles are so different that no comparison on these lines is pos- e.
inza was a personality inseparable n his singing, and this made up for e flaws in his voice.
is vitality and subtle characterisa- tion, which nothing could suppress, and which was as natural to him as breath ing itself, made him unique

Few singers of his type have been able to take in the full range of operatic roles successfully, including the brooding Boris and the lighter-hearted Giovanni.

Tozzi has in most ways a fine voice; he is a bel canto exponent, and has not yet learned to temper his production with his theatre.

Frankly I doubt whether he will ever match Pinza in this regard—he just isn't that type of man.

Cone of R.C.A. Victor's large range of stereo players. The main unit has a record player with ceramic stereo cartridge—now standard with R.C.A.-4 speeds and multi-speaker system. For stereo a second speaker system is added, shown at the right. A similar technique is followed even with the lower priced players.

ROYCE **DISC RECORDING EQUIPMENT**

HI-FI CUTTING HEADS, HOT STYLI, AMPLIFIERS

Labels, Stroboscopes, Turntables, Blanks and All Accessories for the Recordist Write for Catalogue of Prices.

BOX 5041Y, G.P.O., MELBOURNE

VIC., ROYCE RECORDING SUPPLIES, 291 EXHIBITION ST., MELB., FB2592. S.A. SCOTT SALES, 99 CURRIE ST., ADELAIDE, LA1201, ML4919

For the finest in Sound

BRAMCO

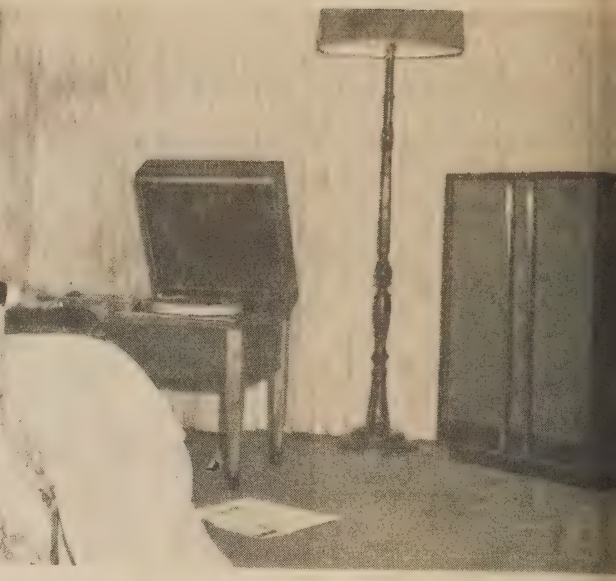
HI-FI TRANSFORMERS

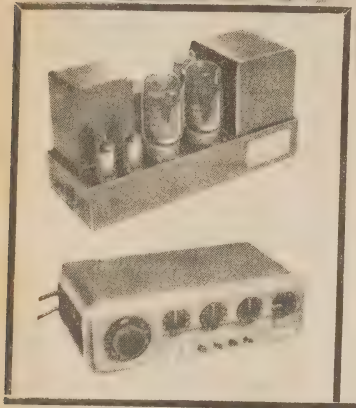
Victorian Representative

J. H. WILLIAM & CO.

50 William Street Melbourne.

ACOUSTICAL a new standard in sound reproducti





QUAD II AMPLIFIER AND CONTROL UNIT:

When you have seen and heard the Acoustical Quad II amplifier and control unit, we think you will agree that it is the world's finest for performance *and* for appearance. It is gracefully styled to match the decor of any home, it has effortless finger-tip control and full range Fidelity from 10 to 60,000 c.p.s. It has perfect Plug-in matching to your choice of pick-up, independent harmonic filtering and many other exclusive design features.

Hear it for yourself and you, too, will be convinced that the Quad II is indeed the world's finest amplifier.

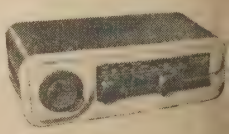
In the illustration above you see the Quad II control unit and FM tuner on the left with Pick-up and Connoisseur Transcription motor fitted into a chairside cabinet. The Speaker system is the Goodmans 325 cabinet which carries the Trebax, Midax and Audium 80 speakers, cross-overs and attenuators.

Acoustical FM Tuner

The outstanding feature of VHF/FM transmissions is the high quality of reproduction which may be obtained when used with modern high standard amplifiers and loudspeakers The Acoustical FM tuner operates in conjunction with the Quad II amplifier and through your Hi-Fi speaker system The tuner is so sensitive that the indicator shows a tuning error of 1 part in 10,000!

When designing a new AM tuner to match the high standard of the Quad II amplifier, the desire for first class performance, even where reception conditions are not the best, was given careful attention. The Acoustical AM Tuner has successfully met these requirements. Also operates through the Quad II amplifier and modulation frequencies of up to 12 Kc/s are excepted

Acoustical AM Tun



BRITISH MERCHANDISING PTY. LTD.
Box 3456, G.P.O., Sydney.
Please send further information on Acoustical QUAD equipment to:

Name .....

Address .....

RH/8/58 .....

Demonstrations and Supplies available from:

SYDNEY: United Radio Distributors Pty. Ltd., 175 Phillip Street; Audio Engineers Pty. Ltd., 422-4 Kent Street.
MELBOURNE: Hom-crafts Pty. Ltd., 290 Lonsdale Street; J. H. Magrath & Co. Pty. Ltd., 208 Little Lonsdale Street; Radio Parts Pty. Ltd., 157 Elizabeth Street; Warburton Franki (Melbourne) Ltd., 380 Bourke Street.
ADELAIDE: Gerard & Goodman Ltd., 192 Rundle Street; Newton McLaren Ltd., 17 Leight Street; Radio Electric Wholesalers Ltd., 26 James Place.
BRISBANE: Chandlers Pty. Ltd., Cnr. Albert & Charlotte Streets
PERTH: Atkins (W.A.) Limited, 894 Hay Street Carlyle & Co. Ltd., 915 Hay Street; Lerova Industries Pty Ltd., 672 Hay Street.

A BRITISH MERCHANDISING PTY. LTD. AGENCY

OSCANINI EROICA IS STILL FINE VERSION

pite its comparative age, here is a disc which retains all its prime ues despite the competition from later efforts. The more I play it, the greater is the musical satisfaction it brings.

EETHOVEN—Symphony No. 3 : Flat Major, Opus 55 (Eroica). ved by the N.B.C. Symphony hestra, conducted by Toscanini. .A. L16124.

hard to review an Eroica without ice to previous recordings of it, iere is no real competitor to this The simple reason is that there is her like it.

vas made some years ago, for both nini and the N.B.C. Symphony Or- a have ceased to exist.

y were both the subject of praise riticism during their lifetime, but iality of their work was unique.

s recording is as fine an example as you are likely to hear. This is Eroica, and Toscanini reaches ap- iate heroic heights which have not scaled before or since.

is filled with power and drive— might think too much. There is grandeur about it, of the kind that perer achieves so well. It marches vith the steadiness of inevitability. n it strikes, as it does in those 13 ssive chords in the first movement, are hammerblows of such signifi- that the music that follows, even gh made up of the same stuff, is not same as that which went before.

This is the kind of subtle magic which Toscanini understands so well,

And what magnificent shape and proportion there is! What cleanly blocked and responsive playing!

It is Beethoven on the heights, not brooding and introspective, but boldly striving and triumphant.

Even the Funeral March has a positive air. It is a hymn of emergence, and not of oblivion.

Of all the Eroicas, this one comes nearer the ideal than any I know—its voice is the boldest and the clearest.

The recording is not as good as the latest production, but it is far from poor quality, for all that.

It is probably from the studio H period, and is almost certainly a re-issue. Although it is remote in quality, it is not one of those hard, deadpan productions which spoiled so many Toscanini records.

It has a concert hall quality which goes rather well with its characteristics. Closer miking mightn't have suited it so well.

The orchestra's performance is superb.

I think this disc is one for the archives, and every music-lover who takes Beethoven seriously will want to hear it, no matter what other versions he may have.

---

t he has a definite stature of his and well merits the good reports s work.

the average the recordings are of ar high quality. Both voices have presence and are beautifully clean. orchestras are not all the same, and is a difference in their quality, but again their standard is good.

ie R.C.A. surface is slightly the bet- but the recordings are probably of recent date. Some of Pinza's have heard before.

ith great pleasure, therefore, I com- d them both. If I liked Pinza best, preference is a personal one. I have vn him longer, and we won't hear ike again.

★ ★ ★

RACHMANINOV — Piano Concerto No. 4 in G minor Opus 40. AVEL — Piano Concerto in G ajor. Played by Arturo Benetti Michelangeli and the Philharonia Orchestra conducted by Ettore Gracis. H.M.V. ALP 1538.

This is one out of the box. A rare display of orchestral brilliance and beauty with tremendously exciting piano playing. Its an excitement that pervades even the quieter moments—something which if not immediately present is always around the corner.

The Rachmaninoff hasn't been recorded before to my knowledge but is so well done that it might have been awaiting this time and opportunity.

The composer's changed outlook in comparison with earlier works is evident. The idiom is unmistakable but, although the long, colourful extensions are still there, and the strong melodies, there is more occupation with pianistic development and instrumental interplay.

All the players have handled the music with the greatest vitality and brilliance, but there is sensitivity too, and dynamic changes which are often breathtaking.

Breathtaking, too, is the pianist, to whom all things seem possible. Power, flexibility, speed, and musicianship are lavishly displayed.

His quality is equally evident in the Ravel, where he shares with the orchestra a performance of exceptional subtlety and range of colour.

Are some of them overplayed — are there exaggerations and studied highlights? Perhaps there are, but these at least are no accident. To hear the slow movement of the Ravel is to revel in sheer magic of imagination and sound enough to keep you occupied for as many times as you care to listen.

The piano is well forward, the orchestra sharp and under fine control. The recording has a beautiful definition and full range.

As I remarked at the start, a record out of the box. The surface is adequate but it could be a little smoother.

TAPE TO DISC

" 45 L.P. Under 7 mins 25/-
" 78 STD Under 7 mins. 35/-
" 78 STD Under 9 mins 40/-
" 33 L.P. Under 30 mins 55/-
" 33 L.P. Under 40 mins 65/-

SEND YOUR TAPE NOW!

ONIC LABORATORIES

ecialists in Studio and Outside Recording
3227 Box 2325 G.P.O. Sydney FM3545

or all J STANLEY JOHNSTON PTY LTD 437 George Street, Sydney

Enclose instructions, cash, and 2/6 postage.

AWA RONETTE

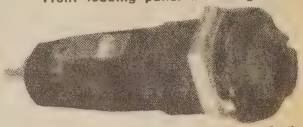
MICROPHONES & ACCESSORIES

Type R572
£19/3/3
High impedance

Type R572/L
£25/3/3
(low impedance, 200 ohms) duo cell omni-directional. Other types also available from

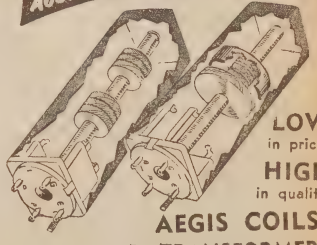
NEWTON McLAREN
17 LEIGH ST., ADELAIDE.
and leading wholesalers.

FUSE HOLDERS
Front loading panel mounting



Also panel lights, neon indicators, plastic knobs.
We have been granted Type Approval No. 1057 for Service Use Fuse Holders.
Manufacturers and Trade Suppliers.
Manufactured by—
AMPLIFIER COMPANY OF AUSTRALIA
85 Asling Street, Gardenvale, S4, Melbourne. Phone XM1472. Associated with—
WILSON'S RADIO SERVICE
Also Available from—
General Radio Agencies Pty., Ltd., 528 Collins Street, Melbourne.
Watkin Wynne Pty. Ltd., 21 Falcon Street, Crows Nest, Sydney, N.S.W.

AEGIS
AUSTRALIA'S OWN BRAND!



LOW in price!
HIGH in quality!
AEGIS COILS & I.F. TRANSFORMERS
Aegis MIGHTY MIDGETS feature Litze, multi-strand wire windings for greater Q-factors. Bright NEW-LOOK pure aluminium shield cans with eyebolts to match.
COILS 18/- ea. I.F'S 25/- ea.
Specify AEGIS COILS and I.F.'s at your dealers.
AEGIS MFG. CO. PTY. LTD:
208 Lt. Lonsdale St., Melb. FB3731

THE MUSIC LOVERS' LOUDSPEAKER

DUODE

The efficient magnet system of the "Duode" 12C is another factor in the superlative performance of these units. The high flux density 16,500 lines at the airgap further increases the feedback damping effect of the "Barker" dual drive (see our June advertisement). This improves transients as well as giving high sensitivity

The anisotropic ring magnet is provided with a massive back plate and centre pole, machined from one piece of carefully annealed special alloy. The outer ring pole is also annealed and then surface ground.

This portion of the "Duode" is entirely Australian made and its high efficiency is a tribute to Australian metallurgists.

FOR THE MOST NATURAL SOUND WHETHER FROM TAPE, DISC, RADIO OR TV USE A TWELVE-INCH 12C "DUODE"

Available in 5, 8, 15 and 30 ohms impedances.

FOR THE MANY OTHER OUTSTANDING "DUODE" FEATURES — SEND FOR DESCRIPTIVE LEAFLE

ENQUIRE AT LEADING WHOLESALERS FAILING THAT WRITE TO ADDRESS BELOW

HIGH FIDELITY PRODUCTS. 19 MARLBOROUGH RD. HOMEBUSH WEST N.S.W

YOU MAY HAVE LIVED ON EARTH BEFORE!

New places, or people you pass in the street, may seem oddly familiar to you. Have you know them in a previous life?

You wonder why you are living on earth to-day and for what purpose you are here. Certain secrets of life and mental development cannot be divulged indiscriminately. If you sincerely feel the need for instruction in the use of your higher creative endowment, you have reached the stage wnere the Rosicrucian teachings will be of practical value to you in your everyday life. Learn how to quietly impress your personality on others, to better your business and social position.

Use your own naturally endowed powers to achieve results you now think unattainable in your present state of untrained and undirected endeavour. Simple Rosicrucian teachings enable intelligent men and women to soar to new heights of achievement, new freedom, new contentment in life.

Devoted to the attainment of the true Brotherhood of Mankind, The Rosicrucians are a Non-Religious, Non-Political, Non-Profit Making Fraternity.

You are invited, though not urged, to write for the free 32-page book—"The Mastery of Life," which has been written to give readers an outline of the world-wide scope and history of this non-commercial fraternity.

This invitation is not to be taken as an assurance that every applicant receiving "The Mastery of Life" will be approved for membership by the Dean of Students.

Please use the coupon below or write to:

SCRIBE: Y.R.B.

The **ROSICRUCIANS** (AMORC)

BOX 3988, G.P.O. SYDNEY, AUSTRALIA

Scribe: Y.R.B.
THE ROSICRUCIANS (AMORC),
Box 3988, G.P.O., Sydney, Australia.

Please send me, without cost, the book "THE MASTERY OF LIFE."

Name_____

Address_____

State_____

MSKY-KORSAKOV — Sche-ade. Played by the Royal Phil-onic Orchestra, conducted by homas Beecham. H.M.V. OALP Played by the Philadelphia estra conducted by Eugene ndy. Coronet KLC 667.

ways annoys me a bit when I two good versions of the same t the same time. When that hap-nd, naturally enough, such occa-re mostly deliberate on the part recording companies—it is inevit-at comparisons should be made can often do less than justice to s favoured disc.

e two are a case in point. The s that both are good.

Coronet I should judge as being lier performance, but it is a very e in the Philadelphia manner.

e is more excitement to it than leecham, and, of course, there is peccable solo work for which Sche-de is a veritable riot. It is the performance; it is spectacular. is Beecham's is glamorous.

erfect example of this difference nd in the cello part at the com-ment of the third section.

we can listen to the Philadelphia's true to their tradition, laying it a welter of glorious tone.

cham, on the other hand, accents usic. The cellos are still beautiful, ey do not emerge as star act. They eir bit, but there is no spotlight em.

that is the thing I liked particu-about Beecham's record. It has the ll-round balance of the qualities make a really outstanding disc. scores, too, in matters of weight ize, clarity and balance.

spite a couple of uncertain spots in sections—one of them a badly note by the first violin which could have been wiped out—I it five stars.

★ ★ ★

VIVA—Fourteen Mexican num-rs played by Percy Faith and chestra. Coronet KLL 575.

is isn't a new release, but I heard ently for the first time, and thought e of the most tuneful demonstra-discs in a long while.

rcy Faith is a specialist in such , and does it superbly.

e sound is extremely brilliant, im-ate and full of vitality and colour. st about every instrument is heard time to time—strings, brass, guitars, , xylophone—the lot.

equency, and particularly dynamic e, are high, and the cutting ampli-exceptionally heavy.

t there appear to be no sour notes roove echoes, and the surface is ess.

ind it very hard to locate good discs test and demonstration which don't after a few hearings.

here is so much life and variety in one that I'm still listening.

★ ★ ★

MOZART—Concerto No. 17 in Major, K453; No. 25 in C Major, 503; for Piano and Orchestra. ayed by Rudolph Serkin and the olumbia Symphony Orchestra. LC 620.

you are used to the Mozart of Solo- and Gieseking, you will probably k Serkin is extremely forthright in version of important Mozart con-os.

And so he is, but it would be a mistake to imagine they suffer thereby.

The accent is on a neat, even taut, performance, which is very clear in its outlines and even cleaner in its execution.

Of similar quality is the recording. The piano is pre-eminent not because it has swamped out the orchestra, but because it has been recorded that way.

And because Serkin was never a man to hide his light.

These are two of Mozart's finest instrumental works, and I liked them immensely.

★ ★ ★

THE BEST OF CARUSO, Volume 3. R.C.A. L17006.

Any and every record of Caruso is worth preserving and hearing, although quite a few of these, going back as they do to 1913, show their age.

If only we had been able to command even a year's electrical recording with this voice, a natural for the microphone if ever there was one, what a difference it would have made!

Even so, some of them are quite amazing when we remember they were all sung into those ridiculous acoustic horns and cut directly into the wax.

There has never been a singer like Caruso, and it doesn't need any further words to commend it to those who think so. The numbers are lighter than those on the earlier discs, which were mainly operatic. They range from Handel's Ombra Mai Fu, O Sole Mio, Over There (a song of World War I), to Rossini's Crucifixus.

A must for any Caruso lover.

★ ★ ★

CESAR FRANCK—Chorales No. 1 in E Major, No. 2 in B Minor, No. 3 in A Minor.

Anyone who loves these Chorales will welcome the chance to hear Schweitzer play them, or any good organist, for that matter, for they are not often heard.

I don't know when they were made, but I suggest not recently.

The organist's sincerity is his greatest asset. He does sound rather ponderous in many places, and there is even a fumble or two now and then.

Scholarship and musicianship go without saying, but a greater vitality, particularly in the magnificent E Major Chorale, would have transformed it.

But, as I have said before when reviewing his Bach records, it is important for music-lovers to know how Schweitzer plays it, particularly as he is one of the living organists whose tradition goes almost back to the days of Franck himself.

The organ tone is satisfactory and very beautiful in places. The jacket notes are by Schweitzer himself.

★ ★ ★

OFFENBACH—Gaite Parisienne. Played by the Hollywood Bowl Symphony Orchestra, conducted by Felix Slatkin. Capitol P-8405.

Quite a good disc, but it does not, I fear, live up to the title "High Fidelity Showpiece."

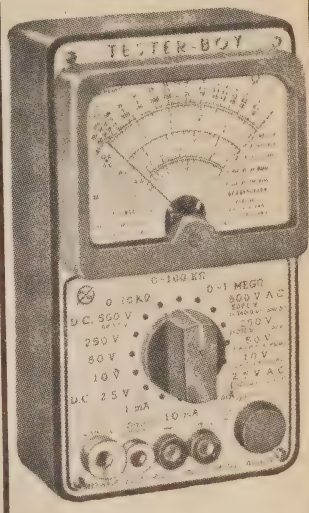
It's hard to put a label on it, but a comparison with Coronet's version by the Philadelphia Orchestra underlines the difference.

Maybe I am being a bit hard, but the analysis of what to listen for on the jacket invites us to be extremely critical.

It sounds quite good, but not as good as that.

"TESTER BOY"

Complete with Leather Case, Test Leads and Batteries



Specifications:
Clear scale 3in x 2in.
Overall dimensions in carrying case 4¼in x 6in x 2¼in.
1,000 o.p.v highly damped movement.
Volts: AC & DC.
6 ranges to 5,000 v.
Resistance: 3 ranges to 1 megohm
Current: 3 ranges to 500 mA.
Output: 2 ranges —20 to + 56 db.

Price £7/10/-

Post — N.S.W., 2/3; Q'ld., Vic., Tas., 3/8; S.A., W.A., N.T. 5/-

Expanded aluminium speaker grill. Fine, medium & coarse mesh Plain 12/- Anodised Gold 15/- sq. foot.

MAIL ORDERS

RADIO HOUSE

PTY LTD.

296 Pitt St., Sydney

Also available at:

6 Royal Arcade and 760 George St., Sydney

I'm a perfectionist!

I'M ALWAYS SURE OF JOINTS SOLDERED WITH . . .

ERSIN Multicore 5 CORE SOLDER

PACKED IN A CONVENIENT DISPENSER PACK

I know Multicore. I know leading radio and television manufacturers in most countries of the world, including U.S.A. use it exclusively. For Multicore is the only solder with more than one core of flux built right in to the solder itself Multicore has five!

This is complete protection against dry joints . . and as Multicore uses only virgin metals, every inch is top quality.

I like the dispenser pack — the wire draws from the top without twisting or damage.

I like the fact that you use far less Multicore on every joint. Top quality convenient, economical and now made right here in a modern Australian plant. What more could you want?

HOW TO USE MULTICORE—apply Ersin Multicore Solder simultaneously with the iron or other means of heat to the clean components to be soldered. No additional flux is required. Only apply solder direct to the iron for tinning. Do not carry solder to the joint on the iron.

MULTICORE SOLDERS (AUST.) PTY. LIMITED

43-51 Nelson Street, Annandale, N.S.W. LA 3666

AVAILABLE FROM ALL LEADING ELECTRICAL WHOLESALERS AND HARDWARE AND RADIO SERVICE STORES

HARD TAUBER — Songs Stage and Screen, including; there Lived a Lady Fair, Love is Best Love, Laughter 'eeping, Love Comes at Blos- 'ime, Love Lost for Evermore, e Little Melody, Smile for Me, Golden Song, Serenade and ɔye. Parlophone PMBO 1012.

ɯ are of my generation you ːognise these songs as among ːt often played over the air in ːyday. Few vocalists have ap- d the popularity of Tauber voice has an appeal unmatched or since.

ːas equally at home in a Mozart ːs in a popular song, although ːonsidered he wasted his talents latter.

inly few knew better how to the gallery with a wide range al tricks.

ıat as it may, a clutch of Tauber on one disc will attract many. side is completely devoted to n Time, one of his greatest suc-

"recreation" process has been re- ly good. Some of the originals te old and others cut so heavily ey were always difficult to play

uency range, too, is not at all ınd the voice shows some signs filters which have been used on it. all that, there isn't a really poor on either side and the best are ood enough.

ny rate, you'll never hear Tauber er advantage.

★ ★ ★

ACHMANINOFF — Concerto 1 in F sharp minor Opus 1. TRAUSS — Burleske. Played Byron Janis (pianist) and the ago Symphony Orchestra, con- ed by Fritz Reiner. A L16123.

he age of the classical traditions no playing are largely behind us, is no dearth of brilliant young s to take their place.

e is another who is endowed with ighest degree of brilliance and

seems determined at all costs to y these two characteristics when- he occasion arises, and it is really nly point of criticism I have to

art of playing strongly without ıg through the keyboard is one eludes so many, and Janis seems ach the point of no return with rous ease.

ere is some monotony in hearing nged passages played flat out.

ne pianists—Arrau is one—are to build their tone so that there iety even in their greatest strength. 't help feeling that Janis and others ıave this lesson to learn.

herwise he has caught Rachmanin- mood with flexibility and certainty. thout the full touch of nostalgia goes with it.

lliance and vitality are therefore utstanding features of both soloist orchestra.

ıave never heard this concerto play- vith such contrasts of smoothness vigour.

e Strauss is new to me—his only dded work for piano and orchestra. ɔrding to the jacket it is a commentary on the show pieces of Liszt and anticipates the later piano concertos of Bartok; a big assignment for a man of 21.

It's brilliant, all right, and both Janis and Reiner revel in it.

The piano is extremely forward and often overshadows the orchestra. Its quality is hard in the loud parts, but the general effect is concert hall. The surface is good and cutting amplitude high.

Dynamic in the extreme.

★ ★ ★

DORIAN LE GALLIENNE — Voyageur Ballet Music. Played by the Ballet Guild Orchestra conducted by Harold Badger. WG.CL.554.

My main commentary deals with the recording, a completely Australian effort, and therefore deserving of praise.

The orchestra is small, with little reverberation but good internal clarity. You can hear everything.

The standard of playing is probably as good as we command, and shows up creditably with a score which the jacket admits is difficult.

The ballet and the music are symbolical, dealing with the tragedies and romance of a flock of wild geese. It has a strange, eerie quality which is skilfully built and sustained, although without the assistance of the stage it could have been pruned in some sections with advantage.

Orchestrally it seems to derive from many sources, inculding French, Russian, English and the "Australian" school, with a pre-occupation with 5/4 time.

The atmospheric passages are effective, and after a few hearings one sees the pattern and progression of ideas much more clearly.

The recording shows a few fluffed notes, but it compares very well.

★ ★ ★

MOZART — String Quartets K 387 in G and K 465 in C. Played by the Juillard String Quartet. RCA L16120

The Juillard players strike a medium between the traditional classic style and a more modern, aggressive type of playing.

Their performances are always bright and brisk, but could not be considered lacking in delicacy or sensitivity.

They strive for clear outlines and press on with them regardless.

They are helped by a recording standard equal to the best of its kind we have heard of late.

The sound is clean and sharp, but the edges are kept under control and the instruments blend beautifully.

I liked the way they presented a cohesive front when playing together and at the same time were able to resolve into their various ways when the parts called for it.

The cello is particularly good. In both quartets it has an important role which it fills with the greatest certainty, firmness and discretion.

There are countless instances of this —the slow movements on each side are as good examples as any.

Both quartets come from the set of six dedicated to Haydn and are among Mozart's finest.

On an all-round scoring basis they would be very hard to better.

Engineering is good quality — RCA can be congratulated upon it.

TV & RADIO BOOKS

PRACTICAL T.V. AERIAL MANUAL. By R. Laidlaw. 80 pages on practical aerial designs with dimensions and installation 7/6

T.V. TIMEBASE CIRCUITS. By C. Banthorpe. 64 pages with 71 diagrams. Describes most popular circuits 7/6

T.V. SYNCHRONISING CIRCUITS. By N. Patchett. 72 pages dealing with practical circuits on this important subject 7/6

T.V. FAULTS. By N. Stevens. 72 pages and 95 diagrams with explanations and probable faults 7/6

T.V. TEST EQUIPMENT. By E. Bradley 80 pages on the construction and use of practical test instruments 7/6

SUPPRESSING INTERFERENCE. By B. Morley. 64 pages on the cause and cure of TV and radio interference .. 7/6

RADIOTRON T.V. VALVES A loose leaf binder with data on all Radiotron T.V. valves and components .. 3/6

RADIOTRON T.V. SERVICE GUIDE. A series of practical articles by A.W.A. engineers on design and service 2/4

RADIO SERVICING SERIES. These books are based on the City and Guilds (London) radio examination course
Vol. 1. Elementary Radio Theory. 64 pages 7/6
Vol. 2. Intermediate Radio Theory. 80 pages 7/6
Vol. 3. Final Year Radio Theory. 80 pages 7/6

FAULT FINDING. Supplementary Volume. 66 pages 7/6

RADIO CONTROL OF MODELS. By G. Sommerhoff. 70 pages describing all aspects of this subject 7/6

RADIO CONTROL. By F. Judd. 140 pages of practical details on the radio control of all types of models 12/9

MAGNETIC RECORDING. By M. Quartermaine. 72 pages with 73 diagrams on wire and tape recording 6/9

OSCILLOSCOPE BOOK. By E. Bradley. 88 pages on construction and use of oscilloscopes and sundry equipment 7/6

R.C.A. RECEIVING TUBE MANUAL. Latest edition. 350 pages on R.C.A. valves with full data, curves, notes, etc. 8/9

MINIWATT TECHNICAL DATA. The latest Philips' publication. A well bound volume listing nearly every valve type as well as transistors and diodes 19/6

RADIOTRON VALVE MANUAL. "ARMV2" Data on all popular Radiotron types 3/4

RADIOTRON TRANSISTORS "TI." A Theoretical description with data on American transistors. Some circuits 3/6

MULLARD TRANSISTORS. The theory and operation of Transistors with many useful circuits 2/10

AMATEUR STATION LOG BOOK. Keep a record of all stations you receive Existing stocks to clear at 4/

ALL PRICES QUOTED INCLUDE POSTAGE

PRICE'S RADIO

5-6 ANGEL PLACE
SYDNEY

PHONE BL3146

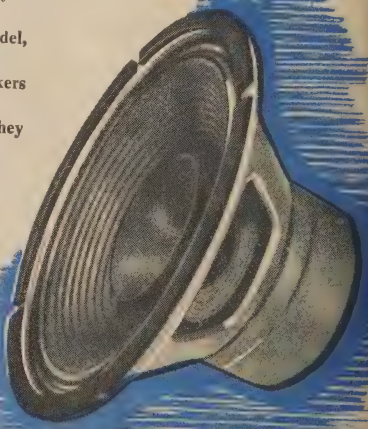
ROLA

The World's Finest High-Fidelity Loudspeaker!

For more than quarter of a century Rola has been a leader in the field of Reproduced Sound. Painstaking research, coupled with skilled engineering design, has made Rola loudspeakers first choice with all who seek the best in sound reproduction.

From the fabulous Hi-Fi 12UX — undoubtedly the world's finest loudspeaker — to the 12-OX. the new 12MX and the single cone 12-O De-luxe, the Rola range provides the complete answer to the problem of selecting the loudspeaker which will do full justice to your other Hi-Fi equipment.

Ask the experts. They will tell you that, model for comparable model, the Rola range of Hi-Fi loudspeakers will outperform any with which they are compared.



ROLA COMPANY (AUST.) PTY. LTD.

THE BOULEVARD, RICHMOND, E.1, VICTORIA. TELEPHONE JB 3921

MUEL BARBER—Symphony in One Movement Opus 9; ire to School for Scandal; o for Strings; Essay for Or- a No. 1. Played by the East- Rochester Symphony Orchest- nducted by Howard Hanson. ry MG50148

el Barber is one of America's pular composers, and one of her

irst symphony contains a fair of those things which are nor- such occasions.

ould be remarkable if occup- ith exhilarating and graphic or- ion were not present. It would lly strange not to find a charac- current of melody mixed with embering the Adagio for Strings, he most perfect pieces of modern writing.

Eastman orchestra is nothing if matic, and it has poured on the in a virtual cataclysm of wild

sheer dynamic range, this disc e an outstanding example. With n control almost right off it still near saturation

uld say that the cutting level is ssarily high, for there are some ricks which betray the fact that ety mark may have been passed, h my pick-up will play almost g.

n't know why this was done, for a level no surface noise could y be heard.

hard to continue without writing essay on Barber and that I don't e to do. The intention of the (see jacket notes) was to present s section of his work under Han ho is collaborating with Mercury pagate American music. In this his success is complete.

e than this—if you are interested sic of today you can scarcely af- o be without it.

★ ★ ★

RAHMS—Symphony No 3 in ajor. Opus 90. Played by the certgebeouw Orchestra conduc- by George Szell. Decca LXT 7.

s disc sent me looking up the s, for it seemed an echo of the r the Decca quality of some years noticeable lift to the highs and e technique of other days.

ess I am mistaken, this is the recording as that issued in 1952. maybe it has been recut. If , not much has happened to it in eantime.

not necessarily condemning it for rather am I attempting to classify.

you play one of Decca's best s today, you will see what I mean this recording technique bore an takeable stamp I like it best play- the old EMI curve plus some So played it is very far from disgraced.

e surface, too, is quieter than was al in 1952, although there are a ot so good spots.

we might expect from Szell, its are dispassionately classic rather romantic. The orchestra plays well orrectly, but without much warmth On the other hand, that's probably what Szell wanted.

A very good comeback.

★ ★ ★

SCHUBERT—Symphony No. 9 in C major. Played by the Berlin Symphony Orchestra conducted by Wilhelm Furtwangler. DGG LPM 18347.

Furtwangler's Ninth was issued previously on two discs, or rather on 3 sides of them, but now it comes on 2 sides and is more in line with its competitors.

The amplitude is not high—it allows more than normal DGG surface noise through but the average radiogram wouldn't notice it. It is some years old, too, and the sound is remote and shallow as compared with today's standard

But it is very clear, and so beautifully turned that one soon becomes lost in the performance so that such deficiencies are not enough to work against its re-issue.

In fact it is the individuality of the performance and Furtwangler's touch that make it something which musically should be preserved.

He treats it in the grand manner. You'll note, too, his own variations in tempo, and his penchant for slow, sustained sound, something which he does superbly well, as the second movement shows beyond doubt.

The task of playing through three or four other versions for comparative purposes was too much for me this time, and unnecessary, for its value lies in itself and not in the competition of others. I did note, however, that they all favoured fuller and heavier tone. or maybe the technicians are now better equipped for it

I would have liked more bass, and unfortunately what there is doesn't respond to boosting

But if it's Furtwangler you want, here it is.

★ ★ ★

RECITAL BY TITO GOBBI Arias from La Traviata, Pagliacci, Tosca, Rigoletto and Un Ballo in Maschera. Columbia 330CX 1501.

Gobbi is one of the best operatic baritones of the day, and one of the two best Rigolettos. This record gives an excellent panorama of what he can do, both good and bad.

He is also a fine actor, and half his value is lost without the sight of him.

For instance we would not be so conscious of the loss of quality in his top notes if we saw him in the flesh.

We hear it first in the last bars of the Pagliacci Prologue, and, as elsewhere, it comes perilously near to a shout.

His drama also lacks a certain "bite," but I must not imply that there isn't much fine and beautifully produced singing.

His Rigoletto arias are particularly good.

All excerpts are from complete opera sets, and some of them are easily picked as such.

The recording is a fine one, clean and quiet, with splendid frequency response and quite high amplitude. All the orchestral parts are first rate.

A complete success.

THE BEST COMBINATION

in the Chain of

Custom Built High Fidelity Home Music System Equipment

ORPHEUS

TRANSCRIPTION TURNTABLE

AND

M.B.H. (Harris)

WIDE RANGE PICKUP

The heart of any music system

●

ORPHEUS
12" TURNTABLE
£29/10/-

M.B.H. (HARRIS)
12" PICKUP
with LP Sapphire Head
£14/15/6

78 St. Sapphire Head
£8/13/6

Spare Sapphire Stylii
78 St. and LP 37/6
Tube of 5

Diamond Stylii for LP or 78 Heads, £10/-/-

M.B.H. 14" & 16" ARMS ALSO AVAILABLE

Write for specifications on these two fine Australian-made products

●

The House of Quality Products

WILLIAM WILLIS

& CO. PTY. LTD.
428 Bourke St.
Melbourne C1
Phone MU2426

SHORT-WAVE NOTES BY ART CUSHE

FLASHES FROM EVERYWHERE

COSTA RICIAN station TIFC, which is broadcasting from San Jose, is to have a new transmitter. The present power of 500 watts on 6037 Kc is to be increased to 2000 watts, according to Ken Boord, of Morganstown, W. Va., U.S.A. The station is at present best received on 9645 Kc when it carries English broadcasts to 3 p.m., with the programs of a religious nature.

IVORY COAST station Radio Abadjan which operates on 4940 Kc is received without the accustomed interference from Kiev, reports a Cyprus listener. The station now carries a news session in English at 5 a.m. on Tuesdays to Saturdays, and at 5.15 a.m. a news session is released in French. At 6 a.m. a further program in French is believed to be a relay from Paris.

EDMUNDTON station VE9AI, which we reported last month on 9540 Kc at 11 p.m. has now been heard in the afternoons. The broadcast is best on Sundays when the station is relatively free from interference from 3.30 to 4.45 p.m., when the frequency at the latter time is used by ZL2. The broadcasts from this Canadian station are fair in strength and the station uses the broadcast band call sign CJCA. Radio 930, the frequency 930 Kc being used by CJCA. The station now uses 200 watts, which has been employed for several months, formerly the power was only 100 watts.

BRAZILIAN stations are increasing at a fast rate, and a listener in North America reports the reception of a further two stations. Radio Cultura de Bahia, on 15225 Kc has been heard at noon, with good signals but only with some selective tuning. Radio Drago Mara, in Fortaleza, has been heard at 11 a.m. on 4775 Kc.

AFGHANISTAN station YAK broadcasting from Kabul on 18637 Kc relays the programs of the broadcast band station Radio Kabul, reports Radio Australia DX Session. The broadcasts on the shortwave frequency are heard in the Middle East from 1.55 to 3.30 a.m. daily, and English is from 2.40 to 3.00 a.m., news is at 2.45 a.m..

TANGANYIKA station on 5050 Kc has been heard in New Zealand on 5050 Kc, closing at 5.00 a.m., in English. The station appears to operate later on Sunday morning when it has been observed closing at 6 a.m. The station suffers side interference from a Russian transmission on 5045 Kc.

HARGAISA transmissions of Radio Somali have made a frequency change due to nearby French Somali station at Djibouti returning to 4780 Kc. The station has moved to 4765 Kc. The 7125 Kc outlet is heard in parallel and English lessons have been heard at 1.15 a.m..

ALGIERS Radio which has been the centre of listening from this and many other locations, has been moving frequency in the 25-metre band. The station has been on 11835, 11860, 11690 and now 11790 Kc. Broadcasts in French take the air from 3.30 p.m., and the power of the transmitter is now 50 Kw.

DAMASCUS has been noted with the broadcasts of the United Arab Broadcasting Service, when using 17855 Kc. The station had news in English at 6 p.m. and closed at 6.50 p.m. but reception throughout was weak. A further transmission from the Syrian station on 15165 Kc has English news at 6 a.m., in a service to Europe. The actual transmission time is 5.30 to 6.30 a.m. with the first 30 minutes in French.

DJIBOUTI, in French Somaliland, has been reported on two frequencies, on 6000 Kc and also on 4780 Kc. A clarification of the position by a listener in the Middle East reports that the station is using 6000 Kc from 10.00 p.m. to 11.15 p.m., and reverts to 4780 Kc. Broadcasts on this frequency are from 4.00 to 8.00 a.m.

DAVAO CITY, in the Philippines, has been reported with a new schedule for its DXH2 station on 7280 Kc. This station operates from 7.00 a.m. to 2.00 p.m. when the relay is from DXHM on 740 Kc. Our verification from the station's other medium-wave relay, DXMC on 900 Kc, showed that the shortwave relay carried its program to 1.00 a.m. The DXH2 transmitter is of 500 watts power, and the address of the station is P.O. Box 121, Davao City.

MANILA station of the National Teachers' College, has both medium and shortwave transmitters. The latter is using the frequency of 4945 Kc with 250 watts power DZB6, on 4945 Kc, is on the air from 9.00 to 11.00 p.m. weekdays, and from 8.00 p.m. to midnight on Sundays.

LUSAKA, the home of the Federal Broadcasting System of Rhodesia and Nyasaland, this month will commence operating on 10.000 watts. This new transmitter has been scheduled to use three frequencies, and will broadcast as follows: 7285 Kc, 3.00 to 4.30 p.m., 9580 Kc, 7.00 to 10.00 p.m. daily except Sunday, when the station opens at 6.00 p.m. Lusaka on the frequency of 4895 Kc, will operate 1.00 to 6.30 a.m. except on Sunday when the station will close at 7.30 a.m.

SOUTH AFRICAN SIGNALS ON 9720 K

Reception of African signals in the 13 metre band in the afterno occurs rarely, so that the logging of Springbok Radio on 9720 Kc. i unusual interest.

THE signals of the commercial service of the South African Broadcasting Commission transmitted fsom Johannesburg were first heard at 4 p.m. on 9720 Kc. The service, known as Springbok Radio, was conducting the normal morning session with frequent commercial announcements which are familiar to the type heard from both Australian and New Zealand commercial stations. The time was announced as 8 a.m. at 4 p.m., and from then onwards time announcements were given each three minutes. At 4.30 p.m. a session of morning exercises was released.

The station suffers interference up to 4 p.m., from its opening at 1.59 p.m., firstly from PRL7 in Rio de Janeiro and later from the Voice of America in Tangiers.

The signals rapidly weaken after 4.30 p.m., and by 5 p.m. the transmission has faded out.

The complete schedule of the commercial service on this, and other frequencies, is as follows: Weekdays 1.00-1.55 p.m. on 3356, 4945, 7295 Kc; 1.59 to 4.15 p.m. on 4945, 7295 and 9720 Kc; 4.19-6.15 p.m. on 7295, 9720 and 11937 Kc; 6.15 p.m.-1.15 a.m. on 9720, 11937 Kc; 1.19 to 2.45 a.m. on 7295, 9720 Kc; 2.49 to 5.30 a.m. on 4945, 7295 Kc; 5.34 to 8.00 a.m. on 3356, 4945 Kc. Sundays, 3.00 to 4.30 p.m. on 4945, 7295, 9720 Kc; 4.34 to 6.30 p.m. on 7295, 9720, 11937 Kc; 6.30 p.m. to 1.00 a.m. on 9720, 11937 Kc; 1.04 to 2.45 a.m. on 7295, 9720 Kc; 2.49 to 5.30 a.m. on 4945, 7295; 5.34 to 7.00 a.m., Monday, on 3356, 4945 Kc.

4VEH to 10 Kw

THE Cap Haitian station 4VEH, which broadcasts from Haiti, is soon to increase its power on shortwave to 10.000 watts according to a long letter from the station secretary Miriam Stockton.

The station which in the past has been operated by the Evangelistic Voice of the West Indies, is now under the control of the Oriental Mission Society. This society which was primarily concerned with mission work in East Asia has recently extended to Central and South America and 4VEH will therefore be an integral part of the organisation.

The station recently had a visit from well-known U.S. DX listener Stewart West, who, as a regular monitor for 4VEH, is concerned with finding a suitable clear frequency for the station.

Plans are also being made to increase the broadcast band transmitter to 5,000 watts and add further area to antenna systems.

4VEH is at present being received on 9639 Kc at good strength at 8 p.m., and the broadcast is also carried on the 350-watt transmitter 4VWI, which is broadcasting on 11850 Kc at the same time. The power of 4VEH was reduced in January due to technical difficulties, but in July has again been increased to 4000 watts which should give an improved sevice.

TANGIER station, which was testing to Europe, using the slogan "The Voice of Tangier," has been verified by Ronald Pearson, Parramatta, N.S.W. The station operates on 9435 Kc, and uses 10.000 w. English broadcasts are listed as from 8.30 to 11.00 a.m. The verification was in the form of a calendar with photos of the transmitter building and towers

DJUBUTI, with transmissions from French Somaliland, which we verified some months ago when using 4975 Kc and then later 4780 Kc, has made a frequency change and is now heard on 6000 Kc. Cyprus listener reports the station as suffering rather severe interference from Radio Moscow on the same channel to sign off at 5.00 a.m. Radio Djubuti is to install a new 50,000 w. transmitter, which would override such interference when it is put into operation.

IQUITOS station, which we reported in the June issue, on 9595 Kc, has been fully identified by the World Radio Handbook. The station was heard in this area to 2.30 p.m. and was best received after Hilversum left the 9590 Kc frequency at 2.00 p.m. The correct slogan of the station is Radio Loreto, and the address Apartado 555, Iquitos, Peru. The station is at present conducting an experimental transmission and will verify reports with a pennant.

PANAMA, a country which in the 1940s was frequently heard, has in the past been reported only when the reception of HOLA and HP5B has been possible. The World Radio Handbook lists the stations active. HOL21 5965 Kc, HP5B 6030 Kc, HOU31 6045 Kc, HORT 6060 Kc, HOLA 9505 Kc, and HOH7 on 9685 Kc.

Sarawak extra broadca

THE broadcasts from Sarawak which we reported in this page, have now be with two programs, carried on three fre The Kuching station is using 9565, 4 4860 Kc. Broadcasts on 9565 Kc are fr to 3.00 p.m., Monday and Wednesday, i Tuesday and Friday in Chinese, and Saturday and Sunday in English. En carried 3.00 to 3.30 p.m. daily, while o day and Sunday the transmission is exte 4.30 p.m. Broadcasts in Chinese on are relayed 7.15 to 8.45 p.m. on 9565 transmissions on 4960 Kc, 9.00 to 10.30 Chinese 10.30 p.m. to midnight. The sion concludes at 12.30 a.m. with Englis last 30 minutes. Broadcasts on 4860 Kc, 6.30 p.m. with Malay to 8.30 p.m.-10.00 English, 10.00-11.00 p.m. in Malayan, 11 12.30 a.m. in English. The powers of th mitters are 7500 watts on 9565 Kc and 4 while on 4860 Kc the transmitter is watts.

Verification from XELZ

THE reception of the Mexican station operating on 11869 Kc, has resulte verification being received by airmail fr station. The broadcasts, which are heard sions 4 to 4 p.m., have been reported in America as carrying a session of English The station relays the broadcast band statio on 1440 Kc, which we have also been and at much better strength than its sh relay. A long letter in Spanish from the requested further reports on reception broadcasts. The station is Radio Independe reports are requested to the transmitter 97-60 piso, Mexico, D.F. The studio ad Av. Juarez, No. 97-60 Piso, Mexico City

ZYU59 on 9730 Kc

A BRAZILIAN station which we have h 9730 Kc has been identified as Rad roupilho, which transmits from Ponta Al Brazil. The station has been heard from but at 1.45 p.m., when the B.B.C. tra on 9735 Kc opens in a broadcast to interference is severe. Before this bou side interference has been noted from the I can station HI2T which is broadcasting o

NOTES from listeners on the stati they are hearing should be sent ARTHUR CUSHEN, 212 Earn Str Invercargill, N.Z. All times Australian Eastern Time.

New 60 metre signals

THOSE listeners who enjoy exploring the frequencies in the early evening will no have heard the usual crop of stations in Ver opening at 8.30 p.m. and the Colombian s resuming transmission at 9 p.m.

Our attention in recent evenings has directed to a loud signal on 5010 Kc, opens at 8.45 p.m. and at times later, wit few identification announcements.

This station we are now certain is the Equador station, which is operated by a C organisation. The station at 8.59 p.m. C recorded music to play "Hark! The Herald Sing" and then follows a religious service observations point to an increase of pow the station, which is listed as using th power of 250 watts. The station uses th sign HC1RP although other references give HC1GP. The broadcasts, which originate Quito, carry the slogan "Radio Catolica" a address is Maldonado y Rocafuerte, Quito.

The frequency of 5020 Kc is used by in Manizales, Colombia, at 9 p.m., but a p.m. on this same channel a weak sig heard, which we have reason to believe is in Venezuela. The station opens with a r and after a brief identification continues musical program. After 8.45 p.m. there is side interference from stations on both 503 5010 Kc, further details on its location coul be heard. At 9 p.m. the channel is blocked by the transmissions of HJFW in zales, Colombia.

IE HAM BANDS WITH BILL MOORE

h August radio amateurs throughout Australia join in the Remembrance Day Contes. in nory of their comrades who fell in World War II. Hundreds of amateurs are active in this, the best supported of all WIA contests.

vent is held annually on the weekend t to V.P. Day, August 15.
ar's contest is the eleventh to be held. on the trophy are the names and call- ie amateurs who made the supreme sacri-

IA invites radio amateurs throughout and territories to participate in the con- r any division to win the trophy it is that every possible amateur participate ie bonus adjustment at a high level. ll have an opportunity to talk with your ex-Service friends and assist your State e coveted trophy.
the 15 minutes' silence prior to the ment of the contest, stations of the vill broadcast the memorial ceremony. ing of last year's contest by the Lieut- of Victoria, Sir Edmund Herring, was y impressive.
les for this year's contest have been The main points include that phone and ons may work one another and that tact made will assist your division to trophy.
ject of the contest is for amateurs in area (this includes those in the Aus- andated Territories and Australian Ant- endeavour to contact amateurs in all areas (VKI and VK2 are considered one call area).
ntest will be run on August 16 and 17 0 hrs. E.A.S.T., August 16, to 1759 hrs. August 17.
od of 15 minutes silence will be observed ations on August 16 immediately prior art of the contest when an appropriate will be made from VK3WIA and re- divisional stations.
I. There shall be four main sections to est. (a) Transmitting phone. (b) Trans- W. (c) Transmitting open. (d) Receiving

Australian amateurs may enter the hether their stations are fixed, portable e but only members of the WIA are or awards.
e/mobile operation is defined as trans- nd/or receiving equipment which is not to any private or public mains or plant. amateur frequency bands may be used ross-band operation is permitted.
ateurs may operate on both phone and ng the contest (e.g. phone to phone, CW or phone to CW and vice versa) but may n entry for only one of the above sec- d in Rule 1.
en log will be one in which points are or both phone and CW transmissions. estant transmitting on phone but receiv- W may still enter for the phone section e versa). Refer to Rule II concerning the log.
y one contact per station per band is and arranging schedules for contacts on nds is not permitted.
y one licensed amateur is permitted to any one station under the owner's call- should two or more operate any par- ation each will be considered a contestant t submit a separate log under his own

ants operating stations other than their l be referred to for the purpose of these "substitute operators."
Operating procedure will be as follows:
contacts: Substitute operators will call memorance Day" followed by the call the station they are operating and the g" followed by their own call sign.
Contacts: Substitute operators will call de" followed by the group call sign com- he call sign of the station they are , an oblique stroke, and their own call

tants receiving signals from a substitute will qualify for points by recording the he substitute operator only.
rants must operate within the terms of nces.
hers: Before points may be claimed for t, serial numbers must be exchanged and dged.
erial number of five or six figures will up of the RS (Telephony) or RST (CW) e figures commencing between 001 and

ncrease by one for each additional con- reaching 999 the contestant will start again

hould show date and time, band, type of call sign, number sent, number received, nus claimed, points claim, and a blank space. Entries must be postmarked not later than September 6, 1958, and addressed to the Federal Contest Committee, W.I.A., Box 1234K, G.P.O., Adelaide.

Points Scores:

For contacts VKO to all other VK State areas 6 points.

For contacts VK1-2 to VKO — 6 points, to VK3-1, VK4-2, VK5-3, VK6-5, VK7-4, VK9-6.

VK3 to VK0-6 points to VK1-2-1, VK4-3, K5-2, VK6-5, VK7-4, VK9-6.

VK4 to VK0-6 points, VK1-2-1, VK3-2, VK5-3 VK6-6, VK7-5, VK9-4.

VK5 to VK0-6, VK1-2-2, VK3-1, VK4-3, VK6-5, VK7-4, VK9-6.

VK6 to VK0-6, VK1-2-1, VK3-2, VK4-4, VK5-3, VK7-5, VK9-6.

VK7 to VK0-6, VK1-2-2, VK3-1, VK4-4, VK5-3, VK6-5, VK9-6.

VK9 to VK0-6, VK1-2-1, VK3-2, VK4-3, VK5-4, VK6-5, VK7-6.

In addition a bonus of 25 points may be claimed for the first contact in each call area on 50 mc/s or above.

11. Logs should carry a declaration that the contestant has operated in accordance with the rules and spirit of the contest. Also a front sheet showing name, section entered, address, call signs claimed score.

The ruling of the Federal Contest Committee of the WIA will be final. No dispute will be entered into.

Awards: Certificates will be awarded to the winners of the phone, CW, Open and Receiving Sections in each call area (Northern Territory will count as a separate call area). There will be no outright winner for Australia. Further certificates may be awarded at the discretion of the Contest Committee.

The Perpetual Trophy will be awarded to the State with the highest tally arrived at in the following manner:-

To the average of the top six logs shall be added a bonus arrived at by adding to this average the ratio of logs entered to State licencees multiplied by the total points from all entries.

Receiving Section: The rules are the same as for the transmitting section.

Open to all Australian SW listeners. Points will be scored in a similar manner to the transmitting contest and logs must show the call sign of the station heard and the serial number sent by it, also the call sign of the station being called. It is not sufficient to log a station calling CQ. A station heard may be logged only once on each band.

PROSPECTS FOR I.T.U.

AMATEUR prospects on the I.T.U. conference front are the subject of overseas comment.

The R.S.G.B., in an editorial, features the necessity of strong amateur representation at Geneva. Actively supported national amateur societies will play an important part in any negotiations in countries where amateurs are so organised it is only reasonable to presume they will have a greater chance of obtaining satisfaction in preliminary discussions. The R.S.G.B., on behalf of U.K. amateurs, has already presented a case to the Post Office. As stated broadly it is to preserve the status quo on frequencies and requested modest additions where they seemed reasonable.

At the regional conference held at Bad Godesburg, Germany, the chief business discussed was how the movement could best present its case at Geneva. International co-operation was forthcoming so that amateur radio in Europe could speak in one voice though in many tongues.

INTERFERENCE

The main terms of reference of the T.V.I. and B.C.I. committee set up by the R.S.G.B. provide some interesting angles that may be of assistance to amateurs working in similar fields. The following are some of these terms.

To contrast and compare the non-interference regulations as applied to the amateur and other services.

To obtain more practical definitions of interference and of technical standards currently accepted by the G.P.O. engineering department.

To consider an approach to the G.P.O. with a view to their formulating acceptable standards for television and sound broadcast receivers.

To advise the council on all aspects of interference to or by amateur radio from or to sound and vision broadcasting and to protect the interests of members individually. The committee will also provide advice, publicity and prepare for publication information on the T.V.I./B.C.I. front.

NEWS FROM VK4

THE annual Palm Beach Convention of the Queensland Division, W.I.A., held in June over the Queen's Birthday was well attended. Seventy-six persons registered, enjoying the ideal weather and surroundings. Commencing on Saturday evening the convention ran through Sunday with a final hidden transmitter hunt on the Monday morning.

State president John Pickles, VK4FP, showed his class in the field by winning all these events.

Bruce, VK4ZBD, was the hardest worker and mainly responsible for the general organisation of the event. Many other amateurs assisted.

Visitors included N.S.W. State president Perc Healy, VK2APQ, who provided a review of the action necessary to provide effective representation at the Geneva I.T.U. Conference. He explained the N.S.W. Division's activity in this field to date.

N.S.W. W.I.C.E.N Co-ordinator Bob Godsall, VK2ARG, spoke on the net's operation in his State. Bob demonstrated his 56 Mc W.I.C.E.N communicator, a portable transmitter/receiver.

Gold Coast conventions are popular and attract nearly as many VK2s as VK4s.

Amateurs in Grafton are planning a special event for radio amateurs during the 100 years' anniversary of the city's founding. The contest to be conducted next year will be fully publicised.

NEWS OF THE MONTH FROM VK2 DIVISION

WORK on the many projects at VK2WI, Dural, is proceeding smoothly. Receiving antennas have been erected for 80 and 40 metres and a 45ft telegraph pole to accommodate future arrays. The mast and antenna raising program is under the direction of Arthur Mead, VK2JM. The floor of the generator shed has been concreted and Jim Cummings, VK2PM, is surveying the 25 kw unit before installation.

The voltage on the power mains often drops to 150 volts and the installation of this unit will be a valuable aid to the effective operation of the station.

Bob Winch, VK2OA, has been in charge of the VHF installations while Bob Thorburn, VK2AIP, is building a GDO for the institute's station, and Max Riley, VK2ARZ, a CR monitor.

The operating procedure for VK2WI Sunday broadcasts has been varied.

The modification will be appreciated by amateurs desiring to make specific inquiries. Upwards of 50 stations answer VK2WI each Sunday after the broadcast and they are called in rotation according to the area in which they reside. This procedure takes approximately two hours. Amateurs with requests will now be called in before the normal round commences.

Lecturer at the June general meeting of the N.S.W. Division was Allan Hennessey, VK2RX, who described amateur variations of command transmitters and receivers.

A topical lecture, it proved of great interest in view of the quantity of this equipment available from disposals. The lecture was recorded on tape and it is in great demand.

Two forthcoming events for the amateurs in N.S.W. are the well-known Blackalls event of the Hunter branch held over the Six-Hour Day weekend in October. This year the opening session will be a dinner at the University of Technology, Newcastle, on the Saturday evening.

Guest speaker will be John Moyle, VK2JU, also present will be the Minister for the Interior, Mr Allan Fairhall, VK2KB. The full program will be published later.

The Blue Mountains section of the W.I.A. will conduct a field day at Catalina Park, Katoomba, on Sunday, October 26.

An extensive program is being arranged, the venue an easy and scenic drive from Sydney, should attract a good crowd.

TELESCOPES

30 x 40 coated lens with tripod, suit rifle clubs, etc., length 28 inches, weight 1½lb.

£7/19/6

Post. 4/5; Int., 5/10.

Telescopes Brand New

30-POWER. Coated Lenses.

£5/15/-

Post N.S.W., 3/4. Int., 4/6.

ALTIMETERS

Brand New. Ex R.A.A.F 0 to 40,000 feet.

£1 each

Post N.S.W., 2/1. Int., 3/3.

MANIFOLD PRESSURE or VACUUM GAUGE

New

£1 each

Post N.S.W., 2/1. Int., 3/3.

AIR PRESSURE GAUGES

New 0-220lb per sq. in.

£1 each

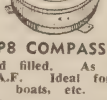
Post N.S.W., 2/1. Int., 3/3.

OIL PRESSURE GAUGES

New. Suit Cars, Trucks, Boats, Stationary Motors, etc. 0-150lb sq. in.

£1 each

Complete with tubing. Post N.S.W., 2/1; Int., 3/3.



P8 COMPASS

Liquid filled. As new. Ex-R.A.A.F. Ideal for small boats, etc.

£3/15/- each

Post N.S.W., 4/5. Int., 5/10.

PRISMATIC COMPASSES

Ex-Army. LUMINOUS. Guaranteed Correct.

£7/15/- each

Post N.S.W., 3/-. Int., 4/-.

OXYGEN BOTTLES

Ex-R.A.A.F. with indicator. Brand New. 3in diam. 9in. length. Weight 7lb

£2/10/- each

Post N.S.W., 6/2. Int., 9/6.

VOLTMETER

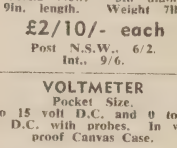
Pocket Size.

0 to 15 volt D.C. and 0 to 250 volt D.C. with probes. In waterproof Canvas Case.

50/- each

Post 3/4. Int., 4/6.

German Field Glasses



Centre focus Lightweight. Colossal Value. Only, per pair **35/-**

Large range binoculars and telescopes in stock. Ideal Geophysical Satellite viewing, etc.

Post N.S.W., 2/1. Int., 3/3.

TELESCOPES Ex-Army

Ottway of London. With variable power adjustments. Length 26in. Weight 12lb.

£12/10/-

Freight payable at nearest attended railway station.

R.A.A.F. TARGET OSCILLATORS

£4/19/6

Freight payable at nearest attended railway station.

MULTI-METER Ex R.A.A.F

AC volts 0-50, DC volts 0-500, OHMS 0-1,000.

£7/10/- each

Freight payable at nearest attended railway station.

TRANSCEIVERS

(2-way Radio)

Ex-Army, No. 22 Set

In excellent condition. Easily convert to suit P.M.G. requirements for use on watercraft, etc. Freq. 2-8 Mc/s 150-37.5 metres.

£18/10/-

Ex-Army, No. 128 Set

Portable. Cost £150. Dry battery operated for lightness. Ideal for firefighting, flood rescue work.

Complete with handset, antenna, leads and accessories. Crystal controlled. Air tested.

£24/10/-

Or with valves but without handset, antenna, leads or accessories.

£12/10/-

Ex-Army, No. 19 Set

With Genemotor and 15 standard Valves. Good condition.

£7/10/-

Freight payable at nearest attended railway station.

BALL BEARINGS

½in-I.D. ½in.-O.D.

24/- dozen

Post N.S.W., 1/9; Int., 2/9.

CONDENSERS

A.W.A., .01 5/- doz. Block Condensers, Bakelite. .01 MF 750v DC, 6/- doz. Ducon 400 MFD, 12 P.V., 6/- doz. Add Postage.

DYNOMOTORS

General Electric

28v D.C. 19 Amps. Input. 1000v .35A Output.

50/- each

3/ Cartage to Rail. Freight payable at nearest attended railway station.

0-1 MILLIAMP METER

PATON

47/6

Post N.S.W., 2/1; Int., 3/3.

FIBRE PULLEYS

(AMERICAN)

BALL BEARING

1 3/8 diam, ¼in shaft, 30/- doz. 1¾ diam., ¼in shaft, 42/- doz. 2 3/8in diam., 3/8in shaft, 54/-, 3½in diam., 3/8in shaft., 66/- doz.

ADD POSTAGE

AIR COMPRESSOR UNIT

BUELL U.S.A. with Oil Trap and Air Hose. New.

£3/19/6 each

Post N.S.W., 6/2. Int., 7/6.

AIRCRAFT GENERATOR

24v DC. 10 0amp.

£17/10/-

Freight payable at nearest attended railway station.

VALVES

1.4 Miniature Series. New.

1R5 ..... 12/6
1T4 ..... 10/-
1S5 ..... 10/-
3A4 ..... 12/6

OTHER VALVES, ALL NEW. GL8020 15/-; EL5 7/6; HA2 Acorn 15/-; H30 Duo Triode 7/6; EB34 7/6; HA1 Acorn 15/-; EF8 7/6; Cathode Ray Tube with socket EL50 7/6; Type 4/1, new, 29/6. Add Postage.

Mechanical REV. COUNTERS

Smiths or Bendix. New 0 to 3,000 r.p.m.

£4/19/6 each

or complete with flexible drive

£6/15/-

Post N.S.W., 3/4; Int., 4/6.

SHOCK MOUNTS

1¼in. New. Made in U.S.A.

7/6 a doz.

Post N.S.W., 1/9; Int., 3/3.

NEW MAGNETO TELEPHONE KITS

Complete do it Yourself Kit.

62/6 each

or £5/15/- for 2 sets.

Each kit comprises one Ericson Magneto, 1 Belt, 1 Handset, 1 Battery, 1 Case, 1 Handset Support and one Diagram.

Already assembled Phones.

£4/10/- each

Post N.S.W., 6/2; Int., 9/6.

AIRCRAFT MAGNETOS

Contain sundry gears, Coil, Electrical and mechanical parts.

Only 9/6 each

Plus 3/6 cartage. Freight payable at nearest attended railway station.

CAPACITORS

1 MFDS 350v 2/-
2 MFDS 250v 2/6
4 MFDS 400v 3/-
4 MFDS 600v 4/-

Post N.S.W., 2/3; Int., 3/11.

VARIABLE CONDENSERS

Single Gang. New.

7/6 each

Post N.S.W., 2/1; Int., 3/3.

BENDIX COMMAND RECEIVER

BC455B

3 to 6 m/cs or 6 to 9.1 m/cs Complete with Valves.

£2/10/- each

Genemotor 35/- extra.

BENDIX COMMAND MODULATOR

Unit BC-456-E

50/-

Genemotor 35/- extra. Post N.S.W., 6/2; Int., 9/6.

BENDIX TRANSMITTER

B.C. 458A. 5.3 to 7 M/cs. with valves.

32/6

Crystal 25/- extra. Post 6/5.

AIR TEMPERATUR GAUGE THERMOME

0-30 minus C 0-50 Plus Suit Cool Rooms, Electron Works and 1,000 other u

£1

Complete with tubing. Post N.S.W., 2/1; Int., 3

AIR SPEED INDICAT

New.

£1

Post N.S.W., 2/1; Int., 3

DOWDLE AUTOMATIC RIVETI GUN

£25

POTENTIOMETERS

50,000 to 100,000 ohms.

3/6 each

Add Postage.

WHIP AERIALS

Ideal for car or TV antenn blackfish rods. 13ft in sections.

19/6

Post 1/9. Int., 2/9.

TRANSFORMERS

TRANNIES, midget output, 5

TRANNIES, I.F., 1600 K/cs, 5

TRANNIES, ex-Navy can 5/- ea.

TRANNIES, power 0210, 230-2 Prim. 6.3 Amp. Centre 5V. 2 Amp. 315-0-315 V., 35

TRANNIES, 115V. 40-0-400 400 V-210-0270-400 V. 3 ment, 35/- ea.

TRANNIES, 115V. to 6.3. T 10/- ea.

TRANNIES, Canadian, voltag known, these can be rewound ea.

TRANNIES, heavy duty 240V put 6.3V., 5V., 325V. ext., A.W.A., £4/15/- ea.

TRANNIES, Trimax 240 to 35/- ea.

TRANNIES, Trimax 230 to 6 x 6.3 at 6 Amp. 6.3, 2 x 6 6 Amp., 6.3 at 10 Amp., 1.7 Amp., 35/- ea.

TRANNIES, Trimax 230V. pr 5V. C.T. 6.3 285-0-285, 45/

TRANNIES, Trimax Modul heavy duty taps secondary, ea.

TRANNIES, heavy duty pr 240-V., 1.5 Amp. sec. 22-OK V.O.15 Amp. Rating 0.33 K Wind double phase 1 freq cycle. A.W.A., £10 ea.

Please add postage.

Radio Experiment

SPECIAL MIXED LOT

2 Potentiometers .1 meg.; 3 assorted Resistors, values ra from ½ to 2 watts; 9 assorted densers; 1 Midget Choke, wound; 1 Midget Choke, d wound; Output Transformer; 2 Transformers; 1 H.F. Reac Ceramic; 1 hank of ass. Hoo Wire, approx. 40ft; 3 length Multi Core Cable;

THE LOT 45/-

Post. N.S.W., 3/9; Int., 5/2

TELEPHONE CABLE

BRAND NEW.

£4/17/6 per mil

Freight payable at nearest atte railway station.

DEITCH BROS

70 OXFORD STREET, SYDNEY

Between Crown Riley Streets.

)BILE RALLIES

of amateur activity that has become
ır overseas is Mobile Rallies—single-
-and are being held regularly in many
The closest local events to these rallies
F fox hunts and field days.

the events cover both VHF and HF
iusiasts with talk-in stations operating
nds and 144 Mc to assist mobiles to
ly location.

programs include junk sales, competi-
s for the longest mobile to control
tact, etc. One event even featured a
r. With so many 7 Mc mobile stations
se days it seems possible that a 7 Mc/
le rally would prove very popular.

the larger rallies attract hundreds of
ions and just as many cars not equip-
adio.

ng records have been established by
ese mobiles. A DXCC mobile award
away.

has already worked 89 different

llies provide the ultimate in amateur
, the personal contact with your friend
and also an opportunity to inspect the
s equipment and exchange ideas.

VHF NEWS

oodman, VK2ZAG, was the lecturer
meeting of the VHF and TV section
ect, Power Supplies. Barry covered
transistor and mobile units, their con-
nd design.

urage activity on the VHF bands, the
organising a 144 Mc convertor building
The components will be available in
nd it is hoped a number of country
ill be able to come to Sydney to join
. The kit will be supplied to other
nateurs who cannot make the trip to

during May in London at the Fourth
ternational VHF and UHF Convention
mplete 144 Mc converter only using
it was complete with overtone crystal
The equipment was the work of F3SK
le transistors are readily available on
. Amateurs on the Continent are build-
erable gear for mobile work using these
s.

GENERAL NEWS

ateurs will appreciate the relaxed power
iction announced on July 1 when the
it was raised to 150 watts. The an-
t over the A.B.C. covering the news
valuable review of the work of the
teur.

evening N.S.W. C.D.E.N. practices
upported and early in July Mr A. R.
ommunications officer of the Civil
Organisation was present at VK2WI
et operation. Mr Grant was kept busy
eries until after 11 p.m. He provided
rs for country net amateurs.

official net run was conducted on July
ıessages from the CD authorities were

).C.P. correspondence course conducted
S.W. Division of the W.I.A. is now in
The course can be commenced at
and inquiries should be directed to the
NS.W Division, W.I.A., Box 1734,
ydney It comprises 48 lessons which
ut to subscribers and answers to ques-
ected and commented upon, on their

orse transmissions have been resumed
Zealand station ZKF. Transmitting on
e following schedule is followed. 1630
words per minute, 1645 hours—10
700 hours—15 w.p.m., 1715 hours—20
730 hours—25 w.p.m., 1745 hours—30
ll times are Australian eastern stations
ractice will be of value to intending

DX-PEDITIONS

pedition to remember is the proposed
ack Tweedy, G3ZY, who will operate
aco from August 5 to August 17. Using
A2CF, Jack will be active on the 14,
8 Mc bands with the main operating
een 0600 and 1000 hours E.A.S.T.

Allan Smith, VK2AIR, DX-pedition to
ve Island and his call VK2AYY/LH,
very popular with the big-time DX

as in receipt of a number of overseas
diciting preferential treatment for indi-
ateurs in some cases dollars were in-
llan returned them without comment.
nd Frank Hine, VK2QL, N.S.W. Q.S.L.
pent a long time planning the details
rip to give the DX fraternity a new

NOVA

The BEST at any price

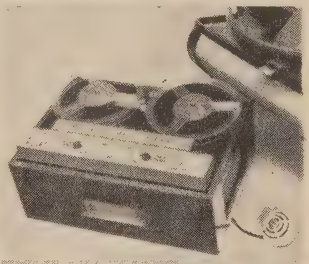
The most keenly priced for its remarkable QUALITY and FEATURES

THE **"NOVATAPE"**

One year guarantee. Simple and most advanced design. Sent ON APPROVAL without obligation.

A REVOLUTIONARY DESIGN OF AN EXTRA LIGHTWEIGHT HI-FI RECORDER AUSTRALIA HAS BEEN WAITING FOR. 3¾in sec. 5¾in Reels (1,200ft) Two tracks. 14lb weight, place-finder. 12in x 9in x 6in.

"SONIC-MIDGET"



3 Speed 1⅞, 3¾ and 7½"/sec. **"STUDIO"**
3 Motor
2 or 3 Heads, single ended, 4-watt, or push-pull 10-watt. Magic-eye or Meter Level Indicator. Place-finder. Single Knob Control. 15"/sec optional.

★ Simple and efficient ONE-KNOB tape Control. No spilling of tape ★ 40 second Fast Forward and Rewind ★ "Differential Brakes" ★ Counter, Place-finder (Built-in) ★ GUARANTEED Frequency Response ★ 1-year written guarantee.

Commercial pre-recorded tapes and tapes from broadcast stations will play perfectly, as "Novatape" recorders are fully designed to C.C.I.R. standards.

SCOOP ! We have been fortunate in procuring a small number of English Tape Decks. We can offer these at the low price of £19 Including Circuit, Chassis Lay-out, etc., Oscillator coil and Transformer for Head. Contact us immediately, the number is limited.

COLLARO DECKS MARK III

with or without PRE-AMPLIFIER, or complete AMPLIFIER.
All coils for amplifier for above.
OUR COLLARO AMPLIFIER HAS SWITCH FOR 3-SPEED COMPENSATION. A "MUST" FOR GOOD REPRODUCTION.

Write today about" NOVAS" **"ON APPROVAL"** scheme, which will enable you to obtain our equipment for a FREE test without obligation to buy.

AUROVOX 1st Quality TAPE, again available 1200 ft. reels 45/6 ea.

ULTRALINEAR O/P TRANSFORMERS

FOR EVERY TYPE OF VALVE, "Nova" pioneered "Ultralinear" in Australia.
UP to 12 WATT (2 impedances), £4/17/6. UP to 20 WATT (2 impedances), £6/3/-.
Other types on application.
O/P Transformers for Playmaster 1 to 11 and for the Mullard 3-3, 5-10 and 20-watt Amplifier Transformers Kit Sets.

TV TRANSFORMERS for R. & H., Philips, A.W.A. circuits.
TRANSISTOR TRANSFORMERS for all circuits.
TRANSFORMERS ON MU-METAL, RADIO METAL & C-CORES

REWINDS and any type transformers or coil to customer's specifications. Call, ring or write for quote on your needs.

TERMS ON LOW DEPOSIT

For further details contact your dealer or

"NOVA" 311 SUSSEX ST., SYDNEY. BM6138-BM2351
Open Saturday Mornings and week nights

CANBERRA: CANBERRA ELECTRONICS, 4 Lansborough St., Griffith, A.C.T. X1324.
BRISBANE: STARLIGHT RECORDING CO., 356 Queen Street. B7336

SUPPORT AUSTRALIAN MADE PRODUCTS AND ALSO HAVE NO SERVICE OR SPARE PARTS WORRIES

CUT OUT HERE

Please send, without further obligation, details of 8/58

.....

.....

ADDRESS .....

I enclose LARGE self-addressed envelope and 9d in stamps

RADIO PARTS PTY. LTD.

562 SPENCER STREET, MELBOURNE FY1251

TV and RADIO TEST EQUIPMENT

VICTORIAN PRICES + 12½% SALES TAX AND FREIGHT.

BATTERY TESTERS.

1. University BTB. 9 range to 90 volts on good/bad scale ..

BRIDGES—Res, Ind, Cap and Impedance.

2. Taylor 110C. .00012 to 1200 uf. 12 ohms to 120 megohm. Power factor measurements ..
3. AVO Uni. type 1. Res 0.1-1 k meg, 1 uuf to 1 k mf, 1 mh to 1 kh, etc. .. 1
4. Omega I 0.05 to 50 k ohms. Wheatstone Bridge ..
5. Omega II 0.05 to 50 k ohms. DC and impedance ..
6. Omega III 0.0001 to 20 ohms. Thomson Bridge ..

CATHODE RAY OSCILLOSCOPES.

7. Astor 2¾in 3 MC Bandwidth Time Base 2 CS to 50 KC Sens. 50 MV per CM .. 6
8. Belclere 1¾in 3 MC Bandwidth 10 C to 50 KC Time Base, 100 MV pe rCM Sentivity ..
9. Cossor 1045K 4in Single Beam Kit. Useful to 10 MC. Time Base to 500 KC ..
10. Cossor 1071K 4in. Double Beam Kit. 7 MC, Time Base Rep. or Trig. to 750 KC .. 1
11. Metrix 222 3¾in BW 500 KC. Sens. 70 MV per inch, Time Base 50 KC .. 1
12. Taylor 32A 4in over 6MC BW. Time Base Rep. or Trig. to 100 KC, Sens. 80 MV per inch .. 1
13. Tele Equipment 720 4in Over 6 MC, Time Base 50 Milli Sec. to 1 Micro Sec. Auto .. 1
14. University 5in 5 MC BW, Time Base to 250 KC, Sens. 150 MV per inch .. 1

CRYSTAL CALIBRATORS.

15. Advance 74 ..
16. BWD. 5.5 and 2 meg. Xtals. Ext. Xtal Socket .. 7

CURRENT TRANSFORMERS.

17. Metrix 430 Multi Range to 15 amp. for 430 M Meter .. Avo and Palec Types and prices on application.
18. University MRCT. Multi Range to 10 amps. AC .. 1

EXPOSURE METERS.

19. Palec. PE1. 2 Range for all B and W and Color Photography ..

FIELD STRENGTH METERS.

20. Seal 10 micro volt to 100 Millivolt 75 ohm or 300 ohm. Balun provided .. 6
21. Klemt AT200 M, 5 Micro Volt, to 50 MV, 4 aerials, 75, 150, 300 ohm .. 16
22. Klemt V 200 M 0.5 Micro Volt to 50 MV, 4 aerials, 75, 150, 300 ohm .. 23

GRID DIP METERS.

23. Hartmann and Braun (Grundig) 709, 6 Ranges, 100 KC to 20 MC, AC operated .. 2
24. Hartmann and Braun (Grundig) 701, 6 Ranges. 1.7 MC to 250 MC, AC operated .. 2

INSULATION TESTERS.

25. Gossen Isognom 500 V, 0-50 meg. (Megger Type) Neon stabilised .. 2

LIGHT METERS.

26. Parvux (Gossen) 2 Range 0-30/0-300 Foot Candles ..

MULTI METERS.

27. Avo Multi Minor 10 KOPV, 1000 V, AC-DC, 1 amp, 2 meg. Leather Case Extra ..
28. Avo Model 8 20 KOPV, AC-DC, Volt to 2500 V, up to 10A AC-DC Overload Prot. ..
29. Hansen. Model HB. 5 KOPV, 1200 V, AC-DC, 300 MA, Res. 1 meg (100 meg. Ext. Bat.), Ind, Cap. DB, S 4
30. Hansen. Model SC. 6 KOPV, 600 V, AC-DC, 300 MA, Res. 2 meg (200 meg Ext. Bat.), Ind, Cap, DB, S
31. Hansen. Model SU2A. 6 KOPV, 12 KV, DC, 1200 V, AC, 300 MA, 5 meg Ind, Cap, DB, S, RF, Diode .. 1
32. Hansen. Model TS. 10 KOPV 17.5 KV, AC/DC, MA, DC Res. to 10 meg. (1000 meg Ext.) Ind. Cap, DB, RF, S ..
33. Hansen. Model M70, 33 KOPV, 3000 V, AC/DC, 12 amp., AC/DC, 200 meg Ind, Cap, RF, DB, S ..
34. Metrix 410 Electricians, AC/DC, Volts to 750, AC/DC Amps to 15. 0-100 ohms ..
35. Metrix 430 20 KOPV, 5000 V, AC/DC, 10 ADC, Res. to 20 meg. DB Access available ..
36. Metrix 460 10 KOPV, 750 V, AC/DC, 1.5, AC/DC, 2 meg, Access available ..
37. Metrix 400 Transclip Clipon AC Volt and Ammeter 300A/600 V ..
38. Leather Holster for Metrix 400 ..
39. Leather Case for Metrix 430 (see also under Current Trans.) ..
40. 1000-1 Split Core Transformer for 0-750 amp with 430 ..
41. Palec M32 1 KOPV, 1000 V, AC-DC, 10 ADC, Res. 1 meg, DB ..
42. Palec MX32 20 KOPV, 1000 V, AC/DC, 10 ADC, Res. 10 meg. DB ..
43. Palec M42 1 KOPV, 1000 V, AC/DC, 10A. AC/DC, Res. 5 meg, DB, Cap ..
44. Palec MX47, 20 KOPV, 3000 V, AC/DC, 10A, AC/DC, Res. 500 meg, DB ..
45. Palec M52 1 KOPV, 1000 V, AC/DC, 30A AC/DC. Res. 5 meg, DB ..
46. Taylor 88A, 20 KOPV, 5 KV, AC/DC. 10A. AC/DC, Res. 5 meg, DB ..

Instruments marked ★ at time of printing are forward order. Others stock. Hire Purchase Terms available over 12 months on £50 orders or over.

Visit without obligation our Special Test Equipment Demonstration Room.

Enquiries to MR. HARRY BRAIDWOOD, RADIO PARTS PTY. LTD.,

562 Spencer St., Melbourne. FY 1251.

RADIO PARTS PTY. LTD.

562 SPENCER STREET, MELBOURNE FY1251

TV and RADIO TEST EQUIPMENT

VICTORIAN PRICES + 12½% SALES TAX AND FREIGHT.

ATORS.

vance H1 Audio Oscillator 15 Cycles to 50 Kc Square or Sine Wave	49	1	6
vance Q1 Oscillator 7.5 MC to 250 megacycles	76	9	3
vance T1 Q Meter, OSC Range 100 KC-100 MC. "Q" Range 10-100 and 40-400	109	18	9
vance 62 Signal Generator 150 KC to 220 megacycles plus Audio Tone 100 millivolt OPT	55	7	0
vance 63 FM-AM Sig. Gen., 7.5-230 MC Int. Xtal Cal., etc.	145	0	0
vo TFM FM/AM 5-220 MC AM, 65-120 MC FM. DEV. plus/minus 150 KC	140	0	0
o Signal Generator Type III 150 KC to 220 Megacycles plus Audio Tone	50	0	0
ssor 1323A Sweep and Marker, 2 and 5.5 MC Xtal 15 MC Sweep	158	17	6
rtmann and Braun (Grundig) 6016 Sweep and Marker 30 MC Sweep 5.5 Xtal	182	9	0
trix 210 Sweep only 20 MC Sweep	92	10	0
ec SG1 150 KC-30 MC OPT Meter	107	10	0
ylor 68a Signal Generator 100 KC to 240 megacycles plus Audio Tone, All Fundamental	53	1	0
ylor 94b TV Wave Form and Alignment Gen. with Pattern and Gradation	162	4	0
ylor 191A Audio Oscillator 10 Cycles to 100 KC Square or Sine Wave	60	16	6

METERS.

lec Ohm Meter. Model OM2. 4 Ranges. 0.025 to 100,	129	10	0
ssen. TR1 ohm in Leather Case. 0.50 k ohm. 3 Ranges	6	16	6

RN GENERATORS.

tor Pat. Gen. 1 Channel. Stabilised. Music Input. Vert., Hor., and Crosshatch 50 MV into 75 or 300 n	129	10	0
ein and Hummel Pat. Gen. 10 Aust. Chan. Turret Tuned, OSC 5 2-5.8 and 16-45 MC	205	0	0

L METERS.

lec, Master, University, Pullin. Large range in stock. Any special at short notice.

RE TUBE ADAPTERS.

ylor Picture Tube Adapters. Covers all Aust., American and European Picture Tubes	4	8	9
lec Picture Tube Adapters for all standard Picture Tubes	1	7	6

ES. GERMANIUM.

niversity Model TV5 up to 250 MC and 30 volts Max. For TVREV	5	5	0
lec Model TVHF, useful to 400 MC and 30 volt Max. For TVM	4	17	6
P 300 M 100 KC 300 MC 50 V Max. AC Suits all CROS	5	7	6
MD 300 For 20,000 OPV Meters	5	15	0

ES.

igh Voltage Palec for TVM up to 30 KV	8	0	0
igh Voltage University for TVR-EV up to 30 KV	8	5	0
igh Voltage for Avo Multi Minor 25 KV	5	5	0
igh Voltage Taylor, 471 for 171A up to 30 KV	11	12	0
igh Voltage Taylor, 317C for 20,000 ohm per volt Meters	11	12	0
igh Voltage Palec for 20,000 ohm per volt Meters	9	10	0
igh Voltage Hansen, 30 KV for Model M70	3	6	6
igh Voltage Metrix for Model 430 30 KV	8	15	0

SISTOR TESTERS.

ossen. PNP and NPN Current ampl. 0-100-200, Col. Cur. C/O 0-1000 u/a	31	7	9

LEADS, PRODS AND CLIPS.

aster Made Test Prods per pair		8	8
vo Special Clip-on For Avo Leads		15	0
ossen Insulated Test Clips Red or Black each		3	10
vo Test Leads with Clips and Prods (avail. separately)	2	0	0
RA Per pair		16	3
alec Per pair		18	0

LEY, INSTRUMENT.

ayneco with Castors and Tilting Top	17	15	0

UM TUBE VOLT METERS.

ossor, 1044 K Kit. Printed Cct. 11 meg. Input. 1500 V AC/DC 4 KV P/P, 1 K meg ohm	29	14	0
ossor, 1044 K Built and Tested	38	11	0
alec TVM 11 meg Input 1500 V AC/DC 4200 V P/P 1000 meg. DB	49	17	6
vo 11 meg Input Volts, Current, Res., Watts, DB, capacity	70	0	0

E TESTERS.

Avo Valve Characteristic Meter MKIII lab type mutual conductance Valve Tester	130	0	0
Avo Valve Tester Type 160, covers testing of over 4,000 Valves	170	0	0
Metrix Complete switching of all Elements Mutual Conductance	72	10	0
alec. Lever switching of Elements. Emission Tester	37	15	0
unke Punched Card. W20 over 1600 cards. Mutual Conduct G. Diode Testing	153	15	0

Instruments marked ★ at time of printing are forward order. Others stock. Hire Purchase Terms available over 12 months on £50 orders and over.

Visit without obligation our Special Test Equipment Demonstration Room.

Enquiries to MR. HARRY BRAIDWOOD, RADIO PARTS PTY. LTD.,
562 Spencer St., Melbourne. FY 1251.

A.C.E. Amplification Communication Electronics

RADIO

PHONE LA 3845

136 VICTORIA RD. MARRICKVILLE, SYDNEY, N.S.W

NOW AVAILABLE

Q.+.T.V. KIT

Build it yourself. No Test Equipment is necessary

COMPLETE TO THE LAST NUT AND BOLT. INCLUDING ILLUSTRATED CONSTRUCTIONAL MANUAL AND CIRCUIT.

The tuner and strip is wired, aligned and airtested

ASSISTANCE TO BUILD IT.

You can arrange to build it at night or weekend in our Newtown workshop, using our equipment, under our supervision.

SUCCESS IS GUARANTEED.

COMPLETE KIT INCLUDING 19 VALVES AND PICTURE TUBE.

17in. £119/10/. 21in £127

Wired and Tested, £12 extra.

Special Q.+. Cabinet to suit set available shortly, priced at £9/10/-.

SEE THE COMPLETED SET OPERATING AT OUR NEWTOWN BRANCH DAILY. EVENINGS AND WEEKENDS BY PHONE APPOINTMENT

A.C.E. RADIO, 636 KING STREET, ST. PETERS. Ph.: LA70

TV KIT SET

R. H. & TV 58 21"
The complete kit.
£118
Wired and Tested
£140

A.C.E. KIT SETS

21"	£110
17"	£105
14"	£101
24"	£125

Wired and Tested £15 extra

ANTENNAE

A complete range from
£5/5/-

RADIOGRAM CHASSIS

Complete with Valves and Speakers

5 Valve	£18/15/-
6 Valve	£23/15/-
8 Valve	£28/15/-
7 Valve, 3 band ..	£29/17/6
10 Valve Hi-Fi ..	£44/15/-

Mullard 5-10 amplifier
Ferguson O.P. Transformer
301 with U.L. Tags
£28/15/-

Mullard 5-20
£36/15/-

with separate control box and mike. Pre-amp. **£6**

AMPLIFIERS

Public Address Range 240v-AC

6 Valve, 10 watt ..	£14/17/6
6 Valve, 25 watt ..	£25/7/6
6 Valve, 40 watt ..	£32/7/6

Battery Operation

6 Valve 6V 10 watt,	£18/15/-
7 Valve 12V 12 watt,	£19/15/-
7 Valve 12V 25 watt,	£24/17/6

BATTERY—AC OPERATION

6 Valve 6 x 240 10 watt,	£20/15/-
7 Valve 12 x 240 12 watt,	£21/15/-
7 Valve 12 x 240 25 watt,	£29/7/6

Send for full details on Radiogram Chassis and Amplifiers.

TURRET TUN

Steanes, Philips, A
Mullard, Asto
From £15/-/

PICTURE TUB

90 degree

14"	£22/
17"	£24
21"	£31/1
24"	£37/1

Fully guarantee

I.F. STRIPS

Complete with Va
Aligned & Teste
Your pick from Ste
R.C.S., Mahood
From £12/10/

A.E. RADIO

Amplification Communication Electronics

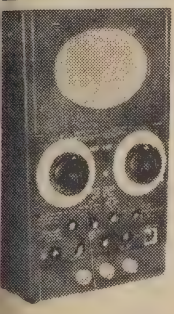
PHONE LA 3845

136 VICTORIA RD. MARRICKVILLE, SYDNEY, N.S.W

AND 636 KING STREET, NEWTOWN LA7008

NINGS and WEEKENDS: "KALUA," Hilma St., Collaroy Plateau — XW5956.

DULWICH HILL, UNDERCLIFFE, EARLWOOD, BUS AT DOOR, STOP No. 42



3 Communications Receivers

e. Converted to 240v. A.C. oughly Tested, Re-aligned. Ovaltone Permag. Speaker.

£34/17/6

EW RESISTORS

0 assorted. 40 Values.

8/6

Postage 2/6.

W CONDENSERS

25 P.F. to 30 MFD. sorted. Mica Paper Electro,

18/6

Postage 3/6.

W 24V MOTORS

wound Hi-speed miniature, R.P.M. £2/10/0

ound with gear box, 2 speed and 25 R.P.M. £2/10/0

P.M.G. TYPE lephone Handsets

£1/7/6

h Dynamic Earpiece and Microphone

£2/5/-

Mikes, New . . . 3/6
0 watt Prefocus Globes 7/6

W C.R.O. TUBES

able for TV Pic. Tubes.

139A 2¾in	£1 10 0
138A 3in	£1 7 6
7 6in	£2 17 6
7in	£1 10 0
Delivery Aug. 5in,	£1 17 6
,, ,, 1in CRO	£1 12 6
Tybing Spot 5in	17 6
	£1 5 0

NEW 3BZ TRANSMITTERS

peration. 2 to 10 Megs.
r tested. Perfect order.
es with P.M.G. requirements. mall ships, bushfires and all ervices.
PLETE WITH 1 CRYSTAL.

£32/10/

TRANSCEIVERS

less valves and meter, £3/-/-
l including valves and meter £4/10/-
less valves and meter, £3/-/-
including 15 octal valves and cro amp. meter . . £5/15/-.
All these units are in excel-condition. For original use parts or conversion.

WALKIE TALKIE

American No. 536 Transceivers. Complete with Valves.

£4/17/6

NEW HIGH IMPEDANCE HEADPHONES

£1/10/

Postage 2/6.

AR8-AT5—COMPLETE STATION

AIR TESTED

Transmitter-Receiver. Aerial Couple Cables, Plugs, Phones, Mike. 1 Crystal to desired Frequency. 24v. Power Supply and Circuits of 2 units. GUARANTEED IN PERFECT ORDER.

£62/10/

Other voltages available.

12V Lighting Plants

Johnston 300 watt direct coupled in 1 H.P. petrol engine. Tested. Perfect order.

£36.

NEW VALVES

217C	10/	VT502	12/6
12C8	12/6	AV11	3/9
6J8	17/6	832A	£3
VT501	12/6	6K7	5/
2D21	15/	12SJ7	12/6
6L6	20/	12SK7	5/
1C6	12/6	12SL7	12/6
1J6	12/6	39/44	10/
1P5	2/6	46	12/6
6A6	12/6	47	12/6
3A4	15/	78	12/6
3B7	10/	828	£2/10/
3D6	10/	843	£1/10/
6AG5	7/6	957	10/6
6AM5	15/6	1625	£1
6AM6	17/6	1629	10/
6H6	2/6	1307A	10/
6J6	15/	1619	£1
6J7G	7/6	2050	£1
6N7	10/	9001	8/6
10	15/	RK75	10/
12A6	2/6	VR75/30	15/
2A3	£1	RK38A	£3
KTW62/6U7	7/6	954	7/6
1M5	7/6	VR105/30	15/
1D5	7/6	1C7	2/
CV6	3/6	1A5	7/6
6F6	12/6	7193	3/6
VR65A/SP41	2/6	829B	£3
KT66	27/6	6B8	12/6
806	£3/10/	807	15/
1K7	7/6	EL3NG	12/6
6X5	10/	83	10/
6V6	12/6	EM1	12/6
1Q5	2/6	866A	15/
811	10/	6AC7	2/6
6E5	12/6	EF50	2/
6BM8	17/6	1000TH	10/
12K8	12/6	5R4GY	£1
1T4	10/	6AJ5	9/6
1R5	10/	EA50	2/6
3S4	10/	1K5	2/6
1L4	5/	5Y3	12/6
		6C4	7/6

NEW AIRCRAFT AIR COMPRESSORS

Complete with Filter. Hi-speed. Ball bearing. 2 cu. ft. per minute. Ideal for small spray gun, etc.

£3/17/6

New Microswitches 6/6 each

Postage 6d.

NEW

240V AC, 1/20 h.p. Motors

Series wound. 7,000 r.p.m.

£2/17/6

NEW TRANSFORMERS FERGUSON VIBRATOR TRANSFORMERS

300 x 300 100 6v. £1 17 6
325 x 325 125 12v. . . . £3 12 6

Inverter Transformers

6v., 240v. 40 watt . . £3 7 6
12v., 240v. 60 watt . . £3 7 6
32v., 240v. 60 watt . . £3 7 6

C.R.O. Transformers

350 x 350 extended to 1000v
6.3v., 6.3v., 215v., 4v. . . £4/5/-
Postage: N.S.W., 5/; Interstate, 7/6.

Power Transformers

240v. A.C.

285 x 285 60mA	£1 17 6
285 x 285 80mA	£2 7 6
285 x 285 125mA	£3 5 0

TV Power Transformers

295 x 295 300mA	£6 15 0
295 x 295 400mA 12 amp Fils	£8 5 0

RELAYS

6v. 3-Pole Miniature	15/-
1700 SPDT	7/6
1300 SPDT	7/6
500 x 500 SPDT	7/6
12 volts DPDT 5 amp.	£1/-/-
12 volts DPDT	12/6
8-16 volts DPDT	12/6
11 volt A.C.	£1/-/-
Hi-speed Polarised relay, 400 ohm	£2/10/- 12/6
1300 ohm DPDT	15/-

½in Square Section DURAL TUBING UP 24 12ft lengths, 1/- per ft.
Hi-lo Phono Transformers 4/6
Spirit Level Bubbles, mounted. 3/6
Canadian Signal Lamps 7/6
Hi-voltage Lead-thru Insulators. 1/6 each; 15/ doz.
Hydrometers, Battery Testers 5/9
Torches, 2-cell. Focusing 6/9
Multi-Strand 4-core Cable, yard, 1/-
100 yards £2/17/6
Tx Var. Condensers, 300 pf, £1/5/-
100 pf. £1/1/-
60 pf with Vernier £1/1/-
30 pf 10/

INDICATOR UNITS for that C.R.O. project

Cabinet, CRO tube, 2¾in ACR10 Socket, Mount, Shield and Graticule,

£1/7/6

NEW

Type R.F. 27 Tuning Units

Ideal for TV or F.M. front ends.

£5/15/-

NEW Indicator Unit

for that C.R.O. Project. 3 valves, VCR139A CR Tube, Cabinet, Socket Mount for Tube Pots, etc.

£3/10/-

AMERICAN PACKSET

F.M. transceivers. Bat. and power. 18 valves, 25 to 38 Megs.

£15/-/-

New Smith Aircraft CLOCKS

8-day movement. Cost Govt. £28

2¼in	£4/15/-
2¾in with sweep hand	£5/15/-

New Coils and Intermediates Standard or miniature to suit all valves

Coils B/C 455 KC	9/6
Coils S/W 455 KC	9/6
Inters	11/6
Loop aerial coils	9/6
Slug tuned H.F. coils to suit 44 meg.	4/6

GENEMOTORS

Input.	Output.			
24v.	250v	100mA	£1	0 0
24v.	550v.	375mA	£2	0 0
24v.	250v.	60mA	£1	5 0
12v.	500v.	350mA	£8	10 0
12v.	1200v.	200mA	£6	10 0
6v	500v.	150mA	£6	10 0
24v.	250v	100mA. New	£2	0 0
12v.	235v.	50mA	£2	15 0
12v.	350v.	50mA	£2	15 0

I.F.F. UNITS

11 Valve Genemotor Powered. Excellent for Parts.

£2/15/

TELEPHONES

Standard P.M.G. Type. Pedestal Magneto Phones, tested, in perfect order.

£6/10/

RECORDING TAPE

E.M.I. Hi Coercivity Tape Ex-A.B.C.

3250ft Platters	£2 10
2200ft Platters	£1 15 0
1200ft Spools	£1 7 6
600ft Spools	18 6

TRANSCEIVERS.

No. 22, Complete with Valves, Power Supply, Mike, Phones, Plugs and Cables.

The addition of Crystals and this set conforms with P.M.G. requirements for small ships, bushfire brigades.

£12/17/6

WANTED

Communications Receivers. Test Equipment, P.A. Gear, Large or small surplus stock. Best prices. Call, write or phone any time

Oil-filled Condensers

1UF 600V 6/6 5UF 2.5V 6/6
4UF 750V 12/6 5UF 400V 6/6
10MFS 500 7.5UF 330V AC 10/-

COMMAND RECEIVERS

and Transmitters Complete with Valves.

£3/17/6 each

453 Q5ER Receiver, £6/17/6.

No. 128 Transceivers

New Condition. Complete with Valves.

£7/17/6

NEW 12V Genemotors

550v. 350mA	£8 10 0
250v. 100mA	£2 15 0

acos

A COMPLETE RANGE

CRYSTAL MICROPHONES
MICROPHONE INSERTS

FOR EVERY PURPOSE

DESK or HAND MICROPHONE, MIC36

This Microphone is ideal for home recording and public address, etc. Response unexcelled for its size and price. The performance is not affected by vibration, shock or low frequency wind noise. Omni-directional frequency response substantially flat from 30 to 7,000 c.p.s. Recommended load resistance not less than 1 megohm, dependent on low frequency response. Can be supplied complete with switch and floor stand adaptor, as required, at a small extra cost **PRICE, £6/18/6.**

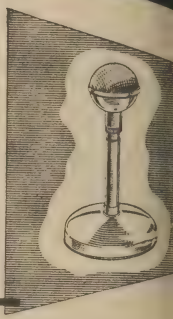
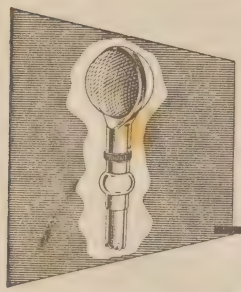


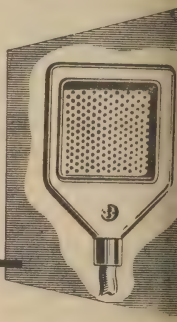
TABLE or STAND MICROPHONE, MIC22

This omni-directional Microphone is robust in construction, with a pleasing appearance. Vibration, shock or low frequency wind noise will not affect the performance. The low frequency cut-off is dependent on the load resistance. The cut-off is given by the equation, F = 80 divided by R, where F = c.p.s., R = megohms. An adaptor (floor mounting) is available at low extra cost **PRICE, £9/18/6.**



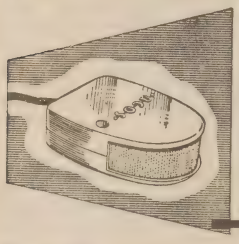
HIGH-QUALITY MICROPHONE, MIC16

This Microphone incorporates the world-famous floating crystal sound cell construction. Its fine performance is not affected by vibration or shock. The fidelity is not impaired by low frequency noise **PRICE, £24/19/6.**



LAPEL MICROPHONE, MIC28

Designed to give freedom of movement, this Microphone is small and non-directional. Housed in a soft, moulded-rubber case, which gives protection against shock, it is provided with a pin at the rear of the case for pinning to the lapel. **PRICE, £5/19/6**

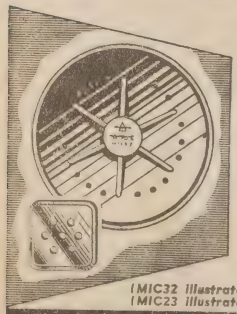


GENERAL PURPOSE, MIC35

The MIC35, is ideal for amateur transmitters, public address, etc. Housed in an attractive die-cast case, it features a high sensitivity and substanially flat characteristics. Provided with a built-in shunt resistance of 2 megohms, it will, when connected to the grid of the input valve, give a substantially flat response from 50 to 5,000 c.p.s **PRICE, £2/15/-.**

HAND or DESK MICROPHONE, MIC33

This Microphone has been designed for the high quality public address and home recording field. High sensitivity and flat characteristics are obtained by a specially designed acoustic filter. Housed in an attractive plastic case with an unexcelled response for its size and price. Unaffected by vibration, shock or low frequency wind noise. Omni-directional frequency response substantially flat from 30 to 7,000 c.p.s. **PRICE, £6/18/6.**



CRYSTAL MICROPHONE INSERTS

These inserts are available in varying sizes, ranging from as small as ⅛ in. square to 1-⅛ in. round, with various thicknesses from 1/32 in. to 1/16 in. Suitable for every purpose, such as hearing aids, public address, tape recording, amateur transmitters, etc., they have responses from 2,250 c.p.s. to 3,500 c.p.s. at -5 db to -30 db. Insert can be supplied with or without 10 meg. resistor as required.

MIC19/4 and MIC32, **£2/15/6: all others, £1/19/6.**

(MIC32 Illustrated)
(MIC23 Illustrated)

Sole Australian Agents:

AMPLION (A'sia) PTY. LTD. 101 Pyrmont Bridge Rd., Camperdown
Sydney, N.S.W. Phone LA 6124

Victorian Distributors: DISTRIBUTORS CORPORATION, 403 Bourke Street, Melbourne.

M THE SERVICEMAN WHO TELLS

ntinued from page 61)

towards the G1 potential more
ıan the voltage will fall on G2,
r being maintained for some-
e .1 to .2 of a second by the
or so capacitance of the final
capacitor

now easy to see why, in such
it is important to use the
n the set rather than at the
oint.)

atively (2) may be achieved by
simpler trick. If we decouple
ly to G2 through a suitable
e/capacitance combination the
on G2 may be held up for a
nger period than that dictated
HT line time constants. It is
cult, for example, to increase
etween .5 and 1 second—ample
the EHT voltage to fall to a
e value.

some circuits achieve one or
these functions more or less
lly and without any particular
ns, but this does not alter the
they still have to be performed.
is of how this is achieved.

ticular, some AC coupled video
seem to come into this cate-
would appear that they have a
tendency to give the cathode a
kick (G1 positive kick) by
of the behaviour of the coup-
acitor between the video ampli-
e and the picture tube cathode.
typical circuit there will be a
ial voltage across this capacitor.
ture tube cathode will normally
at about 30 volts, assuming a
brightness setting, while the
f the video amplifier may be
between 200 and 250 volts.
n the basis of 200 volts, there
170 volts across the capacitor.

As already explained, at the moment of switching off, the HT supply will drop very rapidly; much more rapidly than this capacitor can discharge through the relatively high resistance of the brightness control circuit. Thus the capacitor maintains its 170 volts charge for an appreciable time.

Therefore, as the plate of the video amplifier moves rapidly in a negative direction, so does the cathode of the picture tube. And, since the charge on the capacitor is maintained, the cathode is not only brought down from 30 volts positive to zero, but actually driven negative; this is equivalent to making G1 positive.

Thus, at some instant during the HT line discharge cycle we have the condition where G2 still has a useful voltage applied to it, and G1 is positive with respect to cathode—the exact requirements for rapid discharge of the EHT capacitor.

I think we may sum up as follows:

A picture tube will not be "burnt out" by switching off at the power point rather than at the receiver switch. However, it might suffer the lesser damage of a burnt spot in those cases where the maker has employed one set of switch contacts in the "spot swallower" circuit.

Since this system appears to be used in only a small percentage of commercial designs there would seem to be little point in following this precaution unless specifically advised by the maker, or where spot trouble is experienced and can only be eliminated in this way.

Finally, there would not seem to be any cause for alarm in the occasional generation of this spot due to incorrect switching or other cause, even though it should be avoided whenever possible and certainly not allowed to occur regularly.

A TIMETABLE TO THE MOON WORLD

(Continued from page 7)

the gravitational fields of the
nd moon balance each other. The
rocket will then begin its des-
Because of the practical lack of
osphere, rocket power alone must
he fall.

man has set foot on the moon,
reviously obtained in a rough
th his robot rocket can be posi-
checked to determine the density
mposition of any lunar atmos-
Lunar temperatures can also
isely determined.

astronomers will have a field
olving some of the moon's mys-

hat are the lunar rays? First
inspection of these long-unex-
bright streaks on the surface
veal their nature and origin.

ow did the giant lunar craters
into being? Were they created
canic activity, or by the impact
e meteors?

the moon a daughter of the
Was the moon torn from the
by some giant cataclysm in the
go? Perhaps a comparison of
cks on the moon with those ring-

ing the Pacific Ocean will provide the answer.

When can we expect these answers?

This writer believes that we will have to wait until the turn of the century. Unless a tremendous amount of money is available—or, better, resources are pooled in an international project—a manned landing on the moon cannot be consummated for a long time. It is unlikely that the space station will be built before 1978. After the space station is finished, years will be needed to plan, built and assemble equipment for a landing on the moon.

Why so much time? Manned reconnaissance of the moon will be necessary to pick the landing area. After the reconnaissance, small rockets will be dropped to the lunar surface to yield information as to what lies immediately beneath the surface in the chosen area. Finally, it will take time to assemble and test the giant moon rockets. Only when this is done will man take off for the moon. When he lands, man's first conquest of space will have begun.

The year will be 2000 A.D.

USED RADIO SETS

Special Offer!

'14 Days Money Back Guarantee' If not completely satisfied.

All well-known makes

PHILIPS, A.W.A., KRIESLER. S.T.C., H.M.V., ETC.

4 valve mantel models	£10	0 0
5 valve mantel models	£12	10 0
5 valve d/wave mantel models	£15	0 0
4 valve two-way portables	£10	0 0
5 valve two-way portables	£13	0 0
6 valve two-way portables	£16	0 0
CLOCK RADIOS:		
4 valve	£15	0 0
5 valve	£17	10 0
CAR RADIOS:		
6 or 12 volt	£20	0 0
3-speed portable radiograms	£30	0 0
1-speed portable radiograms	£15	0 0

REMEMBER — YOU CAN'T LOSE WITH OUR MONEY BACK GUARANTEE

THE RADIO MART

439 PITT STREET, SYDNEY

Tel. MA2351

Radio and Television Accessories

RADIO. We specialise in Radio Parts and stock all reliable brands including Resistors, Coils, IFs, Condensers, Speakers, Valves, Pick-ups, Changers, Players.

TELEVISION. Turret Tuners, Picture Tubes, Valves, Transformers, Deflection Kits, Video and Sound Strip, Chassis (R. and H.), Sockets and Accessories.

DRILLS AND TOOLS. Black and Decker products. Sher Drills and Kits.

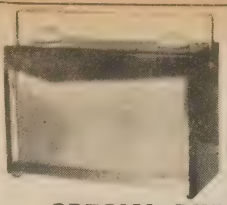
SETS. Radiogram—Mantel and Portable.

ELECTRICAL. Cake Mixers, Toasters, Iron, Percolators, Vacuum Cleaners, Lawn Mowers, 2 or 3 Brush Polishers, Pressure Cookers.

SHAVERS. Diplomat, Braun, Sunbeam, Philishave.

DAVIS RADIO CO.

Wholesale Radio Distributors,
1st FLOOR, WEMBLEY HOUSE,
841 GEORGE ST., SYDNEY
Phone BA3917. Open Saturday Morning



MAKING R. & H. TRANSISTOR PORTABLE?

COMPLETE KIT OF PARTS

Including 6 transistors, Rola 5F speaker, attractive and durable plastic covered case and all parts necessary to complete this set.

£24

POST EX

SPECIAL PURCHASE—NEW ENGLISH TAPE DECKS £32/15/-

These popular decks have all the facilities for making a first class Recorder. (We cannot advertise the make). Features include push-button control, 4 heads (2 record, 2 erase), 2 tr 3 speed, tape measuring device, 2 motors

New Power Transformers

60mA prim.: 240v with 230v tapping. Sec. 285 x 285 with 6.3v filament winding, 60mA.

27/6

Plus Postage: N.S.W., 3/6; INT., 5/3.

NEW 4in Per-Mag. Speakers

5T. or 7T. Trans.

30/-

Post. and Packing, 3/6.

New Midget Power Trans.

40mA Prim. 250v Sec. 225 x 225 with 6.3v. Fil. Winding. Upright or Flat Mounting. Size 2in x 2½in.

25/-

2/6 Postage, N.S.W.; Interstate, 4/6.

30mA. 240v. Prim. 150 x 150v Sec. with 6.3v. Fil. Winding.

22/6 **Postage, N.S.W., 2/6; Interstate, 3/6.**

BUILDING R. TV & H. TV SET?

All Major Parts in stock, including R.C.S. IF Strips and Tuners, Valves, Power Transformers, Chassis, etc.

NEW DYNAMIC HEADPHONES

These headphones made by Rola are a high-quality unit giving excellent tone. Fitted with comfortable ear pads.

25/- **Post 4/6.**

New No. 7 HAND MICROPHONE

with Switch Dynamic Unit.

20/-, plus Post.

VALVE SPECIALS

20/- will purchase anyone of the following Valve Specials.

10	1P5	3	1S5
6	1C7	3	6K8G
10	1Q5	8	6SH7
12	1K5	8	6AC7
10	954	6	6J7G
6	6C8G	4	6U7G
10	EF50	5	12A6
12	VR65A	2	6X5GT
3	1T4	7	6K7G

Post and Packing, 4/6 extra.

ALL VALVES ARE NEW.

NEW 6H6 OR 6H6GT VALVES

Individually Cartoned.

12 for 20/-

Post 2/6.

New Transmitting Valves

803	30/
100TH	15/
866	12/
811	15/
830B	12/6
809	10/

Special price for quantities.

New Micro-Ammeters

New Paton Micro-Ammeters

0-500 mA, 1¾in diameter. Flush mounting.

25/-

Post and Packing, 2/6.

CONDENSER SPECIAL

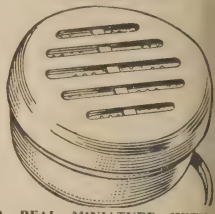
Boxes of 100 new mica paper and electrolytic condensers in values ranging from 50pf mica to 5 400v paper. Values include .0001, .00025, .00075, .01, .02, .05, .1. Also 500 mfd/12v., 10 mfd/40v., 16 mfd/350v., electrolytics.

25/- **per 100.**

Post Extra: N.S.W., 2/6; Int., 3/6.

PILLO-FONE

EXTENSION UNIT



IT'S A REAL MINIATURE WITH UNIT. Install it anywhere, in the si workshop, garage or any room in the Just connect across voice coil of the speaker. The "PILLO-FONE" IS THE CONVENIENT LITTLE UNIT YET DE 3½in Diameter by 1¾in deep.

2

POST FREE

NEW I.R.C. RESISTO

I.R.C. carbon resistors, ½, 1 and 2 w values 50 ohms to 5 meg., including popular sizes, 3T, 15T, 20T, 25T, 50T, 250T, 500T, etc.

(Standard resistor colour code supplie

100 for 25/-

(Plus 1/6 postage.)

NEW HIGH IMPEDAN HEADPHONES

30/- Pos

Telephone Generator

New small telephone generators; for bell ringing, etc.

7/6 **Postage 3/-**

GERMANIUM DIODE

for that Crystal Set, 6/-, POST F

NEW VIBRATORS

A.W.A. Oak 6-volt Synchronous 7-pin bas
A.W.A. 12 V Synchronous octal base
Post 1/6.

VALVE SOCKETS

9-pin Ceramic Loctal	
5-pin Amphanol Ceramic	
8-pin Loctal	10
Acorn Ceramic	3
7-pin Miniature	1
9-pin Miniature	1
8-pin Octal	1
5BP1 Ceramic	4

Post Extra.

Please address all correspondence to 332 Parramatta Road, Stanmore, N.S.W.

METROPOLITAN RADIO SUPPLIES

332 PARRAMATTA ROAD, STANMORE, N.S.W.
640 KING STREET, ST. PETERS, N.S.W.

PHONE LM739
PHONE LA608

EW VALVES AT BARGAIN PRICES

.. .. 4/6	6SH7 .. .. 3/6	6K7GT 7/9	EL32 .. .. 10/6
.. .. 10/	1Q5G 5/	6U7G 6/6	KTW62/6U7 .. .. 6/6
.. .. 10/	1P5G 5/	6Y6GT 12/6	VR65A 2/6
.. .. 10/	1C7G 5/	6J7G 5/	CV6 .. .. 3/6
.. .. 12/6	1K5G 2/6	6U7G 5/	36 .. .. 7/6
.. .. 12/6	6AC7 .. .. 2/6	6J6 .. .. 15/	7193 .. .. 3/6
GT 9/6	6C8G 7/6	6F8G 10/6	954 .. .. 2/6
GT 9/6	6S8T 8/6	6A3 .. .. 15/	955 .. .. 10/
G 10/6	6F6G 9/6	7C7 .. .. 3/6	12A6 .. .. 10/
G 9/6	6H6 .. .. 2/6	7A6 .. .. 3/6	EF50 .. .. 2/6
'GT 9/6	6H6GT 1/6	78 .. .. 7/6	110TH £2/9/
GT 10/	6J7G 7/6	71A 7/6	811 .. .. £1
8 .. .. 10/	6K7G 3/6		866/866A 15/
K7 .. .. 7/6			12SH7 .. .. 5/
2 .. .. 10/6			12SL7 .. .. 10/
7GT 9/6			6K7G 4/6
3 .. .. 12/6			100TH 20/

Please add Postage on All Valves.
SPECIAL PRICES FOR QUANTITIES.

No. 22 TRANSCEIVERS

transceiver covers a frequency of 2 to 8 Mcs. and has been l by the P.M.G. for use on fishing boats, small craft, bush ades, etc., if converted to crystal control, for which it is dapted. These sets are supplied complete wtih valves, 12v. power supply, dynamic headphones and micophone leads.

£12/17/6 F.O.R.

No. 19 TRANSCEIVERS

These units cover a frequency of 2 to 8 Mcs. and contain 15 6.3 volt valves, including 1-807, 2-6V6, 6-6K7, 2-6K8, 6B8, etc., also 500 microammeter.
Units supplied complete with valves, leads, junction box, genemotor power spply and dynamic headphones and microphone operate from 12v. supply.

£7/15/- PACKAGE 15/- EXTRA.

No. 11 TRANSCEIVERS

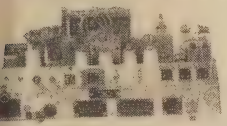
complete with valves, high and low power genemotors, leads phone.

£5/15/- F.O.R. PACKAGE 15/- EXTRA.

No. 108 TRANSCEIVERS

These 6-valve Walkie-Talkies are supplied complete with valves, headphones and microphone.

£6/15/-

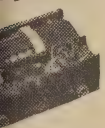


DAR RECEIVERS

dar receivers type ZC955 contain 16 d a 30 Mc. I.F. strip suitable for your iment. Units are in new condition.

£2/17/6
Packing 15/- extra.

R522 GENEMOTORS



28 volt input regulated and filtered; output filtered 300 volts at .26 amps; 150 volts at .01 amps; 14.5 volts at 5.0 amps.

Completely shielded in metal case. 12 x 8 x 5 inches.

O.R. Each 25/

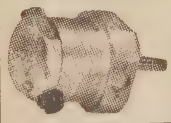
INDICATOR UNITS

These indicator units contain V.R.C. ACR/10 C.R.D. tube and socket. Ideal case for the small scope.
(Used, fair condition.)

30/- F.O.R.

24 Volt Midget Motors Shunt Wound

Fully Laminated Fields Wound Armature. Sixteen Segment Commutator, ball bearing. Ideal for Model Trains, Hobbyists, etc. Condition new.



Price, each
25/-

Packing and postage: N.S.W., 1/6; Interstate, 2/6.

COMMAND EQUIPMENT

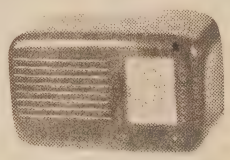
RECEIVERS
3-6 Mcs or 6-9 Mcs. WITH VALVES
55/-

TRANSMITTERS
WITH VALVES AND CRYSTAL
55/-

MODULATORS WITH VALVES
25/-

Post extra on Command Equipment.

MAKE UP THE "LITTLE GENERAL"



£12/17/6

Complete kit of parts for the 1957 "Little General" as featured in R. and H., including attractive bakelite cabinet with slide dial. Price includes valves and Rola 5F speaker and kit is complete to the last nut and bolt. (Set wired and tested £2/15/ extra.)
Cabinet size 11½in long, 7in high, 6in deep.
Foundation Kit for above comprising Bakelite Cabinet, Chassis and Dial Assembly 57/6
Post and Packing: N.S.W., 14/6; Interstate, 25/.

New Command-Midget Genemotors

37/6

Input 24v., output 250v at 60 Ma. Ideal for electric razors, etc.
Used but in good order, 25/.
Post: N.S.W., 3/6; Int., 5/.

CIAL—FREE VALVE OFFER

WITH ALL ORDERS OF £6 OR OVER SIX NEW VALVES SELECTED FROM THE FOLLOWING LIST WILL BE SUPPLIED FREE. (COUNTRY ORDERS, PLEASE ADD 2/6 EXTRA POSTAGE.)

5GT — 1C7G — 6H6GT — 6K7G — VR65A — EF50 — 954 — 6C8G — 1P5GT — 1K5G — 7193 — CV6 — 6J7G — 12SK7.

EW 12V GENEMOTORS

12v. 4.5 amps. Output 22v. 100 mA. le for Car Radios, Amplifiers, etc.

£2/7/6
Post: N.S.W., 6/6; Interstate, 9/6.

ROTARY CONVERTERS

Input 24 to 32 volts. Output 240 volt, 60 cycles, 150 watt.

£16/17/6 F.O.R.
New Condition.

A.W.A. HF Signal Generators

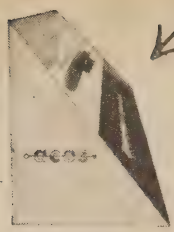
New Condition: Freq. 25 to 50 Mcs. Suitable for TV servicing, etc. Supplied with Calibration Chart.

£32/15/- F.O.R.

METROPOLITAN RADIO SUPPLIES

2 PARRAMATTA ROAD, STANMORE, N.S.W. PHONE LM7398
0 KING STREET, ST. PETERS, N.S.W. PHONE LA6087

acos



The Black Shadow makes its appearance in a fancy black and yellow transparent box You'll find it at your dealer's

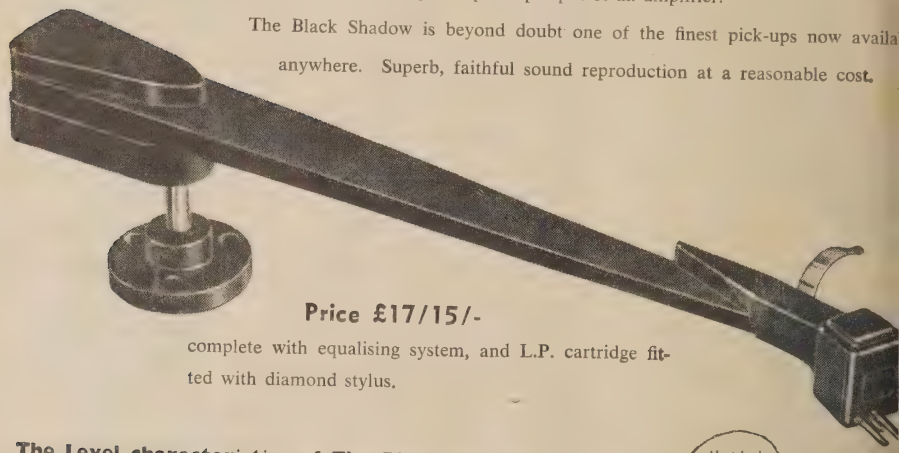
THE BLACK SHADOW

The Black Shadow, the new pick-up from Acos, is a dramatic advance.

With its associated network, The Black Shadow achieves a level response up approximately 18 kc/s (within plus minus 3dB) without any further correction. feeds directly into practically every high-quality amplifier.

An alternative output, from a selector switch, gives a velocity characteristic feed directly into the magnetic pick-up input of an amplifier.

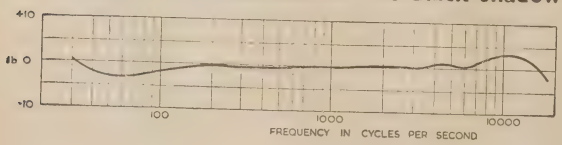
The Black Shadow is beyond doubt one of the finest pick-ups now availa anywhere. Superb, faithful sound reproduction at a reasonable cost.

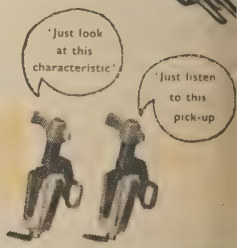


Price £17/15/-

complete with equalising system, and L.P. cartridge fitted with diamond stylus.

The Level characteristics of The Black Shadow





Sole Australian Agents:

AMPLION (A'sia) PTY. LTD. 101 Pyrmont Bridge Rd., Camperdown, Sydney, N.S.W. Phone LA 6124.

Victorian Distributors: DISTRIBUTORS CORPORATION, 403 Bourke Street, Melbourne.

NSWERS TO CORRESPONDENTS

(West Kempsey, N.S.W.) writes to tell the good results he has had from the Amplifier for a Crystal Set (March, e has been able to operate a loudspeaker resumably from the local station. Now to know whether it is possible to make ave converter using transistors and also loop-stick can be used in place of al in the Handie Talkie.

y thanks for your report on the Am- .S. and it is gratifying to hear that it is so well. Unfortunately the short-wave if not impossible, is at least impractical untry at the present time, since we have tors suitable for these frequencies. In are lucky to secure even broadcast types antity. It should be possible to use the with the Handie-Talkie and most other In the case of very small loops the ce may be noticeably better, and should st equal to the larger loops.

(Tarpeena, S.A.) is one of our newer ho has a number of problems worrying icularly concerning valves, but also cover- d circuits and amateur licence require-

e fundamental difference between the nd indirectly heated cathode is that one d for operation from DC and the other ner AC or DC. The directly heated cannot be operated from AC for two The varying nature of the supply would o vary its temperature 100 times a second cps supply) resulting in a 100 cps hum tput. Secondly, since the cathode is part gnal circuit and the filament supply is of the bias supply, any AC present at t will introduce very severe hum. By the cathode from the source of heat ment or heater) and giving it sufficient can hold it at a constant temperature cycles, as well as separating the input om the heater supply and its possible bias. Finally, because AC power is much cheaper than DC (battery) power, ally possible to design indirectly heated r a higher order of performance than is ally possible with battery valves. We uite see your point in comparing the the 6U8, since the functions for which s are intended are not likely to have a t bearing on their life. In any case, we gree that the 1D8 has a very short life ontrary it seemed to be available enough its day. We would like to know the s under which it fails to give satisfac- before commenting further. We sug- try to obtain a copy of the RCA Re- Tube Manual, an inexpensive data book a simple but very complete explanation functions as an introduction.

circuits are something of a misnomer ey should really be called "etched cir- They are made from sheets of insulating similar to punching bakelite, to which d a thin copper sheet. By a process h that used for lithographic block making, er is etched away where not required, ines of copper which become the conduc- the circuit.

ot possible to state the range of a par- ze transmitter, since so much depends on , time of day, season, and many other Under favourable conditions very small ers can reach the other side of the world, others, they may have difficulty in being few miles away. Full details of the Licence requirements may be obtained Chief Radio Inspector at the G.P.O. at arest capital city.

(Drysdale, Vic.) writes to suggest we pro- modern version of the All-Wave AC Ten, front end" having similar characteristics mentions three overseas broadcast stations ves regularly from midnight to dawn on lve clock radio, and wonders if we would help identify them. He also submits a of voltage drop/resistance problems, fin- with the description of a simple set for use in the "Reader Built It" page.

nny thanks for the suggestion I.R.K. and keep this idea in mind, though we cannot anything for the immediate future. We ble to help you in the matter of station ations, most DX activity these days being to the short-wave bands. Our short- iter, Art Cushen, may be able to help you are to send him details. The question of resistors is one we encounter quite regu- d the subject has been dealt with at fairly intervals over the years. The main point it is not sufficient merely to know the oltage and the amount which needs to be d." It is essential to know the amount nt drawn as well, otherwise it is impossible calculate the required resistance. Briefly, y find the resistance value by dividing the quired by the current which the appliance aw when operating at correct voltage must be in volts, amps, and ohms. The ription has been filed for possible future use in the Reader Built It page. Incidentally, congratulations on your circuit drawing. Had it been finished in Indian ink we could have reproduced it directly. Many thanks for the kind remarks about the magazine and the staff and you may rest assured we will do our best to maintain and improve the standard.

R.S. (Ryde, N.S.W.) sends an advertisement from a local paper concerning a coloured screen for use in front of a TV set. He suggests that the Serviceman may care to comment on the device.

A. Many thanks for your interest R.S., and we will pass your letter on to the Serviceman for his possible comment. The device appears to be similar to that which the Serviceman discussed recently (December, 1957) and, if so, would seem to have little real value in improving picture quality. As far as producing colour TV is concerned it is completely useless — something which should be fairly obvious to anyone who stops to think about the problem.

W.C. (Singapore) expresses interest in the article on Doppler navigation in the May issue, but would like an explanation of the Doppler phenomenon.

A. The fact that the frequency appears higher than it actually is when the generator is approaching the observer may be explained by the fact that each cycle emitted has less distance to travel to the observer than the preceding one. It thus arrives sooner than it would from a stationary generator, producing, at the receiving point, a frequency which is higher by an amount depending on the rate at which the generator is approaching the observer. The reverse is true when the generator is moving away from the observer. It would appear that, in the case of the radio altimeter, that Doppler effect is likely to be small compared with the frequency shift due to time difference, which is generally employed.

R.T. (Shepparton, Vic.) has a five valve superhet radio and he would like to know the best value for the volume control.

A. Without more information on the receiver than you have been able to give us it is difficult to be specific. However, it is most likely that an 0.5 megohm potentiometer would be used. Occassionally other values such as 0.25 and 1.0 meg. will be found but the set would probably work satisfactorily with the 0.5 meg value.

J.M. (Hamilton, Vic.) writes to point out an error in a circuit which was reprinted from another publication.

A. Many thanks for the information which has been duly noted. Very occasionally a mistake manages to get into one of our own circuits and apparently some overseas publications have the same difficulties. We have not had a great deal of experience with electrostatic tweeters as yet but we will keep your suggestion in mind.

R.W. (Canberra, A.C.T.) asks about the prevention of interference to a radio from an automatic electric iron and also the possibility of our describing a battery operated record player using transistors.

A. A capacitor across the contacts of the iron should eliminate or at least greatly attenuate the interference. The main problem is to obtain a capacitor which will withstand the heat. Certain types of mica capacitors may be satisfactory but you would have to choose the unit carefully. If the capacitor were connected across the contacts and bound in asbestos string, the risks or results of a breakdown would be minimised. The record player has already been given considerable thought. Before going ahead we need to be assured that suitable battery operated motors will be in good supply.

E.T.R. (Gladstone, N.S.W.) asks about information on radio control of models.

A. A series of articles on the subject, written by Mr. Gil Miles appeared in the September, October and November, 1950 issues. These articles were more of a survey of suitable techniques than a specific set of information on making a particular radio control unit. We are thinking seriously of publishing a more specific design and it is quite likely that transistors would be used, for the model unit at least. Two books on radio control were reviewed in the November, 1957 issue.

R.D.C. (Mundalla, S.A.) forwards his subscription for another 12 months and gives his comments on a wide range of experimental activities in which he is interested.

A. Many thanks for the sub. We have lots of new ideas in mind for the future and we are sure that many of them will be of interest to you. Our main problem is to fit them all in. We do not know of any crystal earpieces available through disposals dealers in quantity. Most of the crystal earpieces we have seen have been very expensive so that they are not a very good proposition for crystal-set builders. We are aware that there is a big interest in amateur topics, such as VHF and single sideband. One of our big problems in this regard is the large amount of experimental time required to develop equipment with high performance and at the same time especially suited to Australian conditions. There is a great deal of argument in amateur circles as to what constitutes S9. At one time it was suggested that 1 uV on the aerial terminals of the receiver could be regarded as S1 and that each S point above this represent a 6 db power increase, but many amateur reports vary greatly from this. The transistor portable design is presented, as you will see, in this present issue. If you have any success with the transistors in the bushfire packset, by all means let us have all the details which we would be glad to consider for publication in the "Reader Built It" section. Your question re noise in receivers may best be included in the "Here's Your Answer, Tom" feature, as a satisfactory answer would be too long for publication here. Thanks for the appreciative comments

The Radio, Television and Hobbies Query Service

All queries concerning our designs, to which a POSTAL REPLY is required must be accompanied by a postal note or stamps to the value of TWO SHILLINGS.

For the same fee, we will give advice by mail on radio matters, provided the information can be drawn from general knowledge. UNDER NO CIRCUMSTANCES, however, can we undertake to answer problems involving special research, modification to commercial equipment or the preparation of special circuits.

Whatever the subject matter, we must work on the principle that a letter is too involved if the reply takes more than 10 minutes of our time.

Queries not accompanied by the necessary fee will be answered FREE in the columns of the magazine and presented in such a way as to be of interest to other readers.

To those requiring only circuit reprints, &c., we will supply for TWO SHILLINGS diagrams and parts lists from our files covering up to three constructional projects. Scale blueprints showing the position of all holes and cutouts in standard chassis can be supplied for 5/-. These are available for nearly all our designs but please note they do NOT show wiring details.

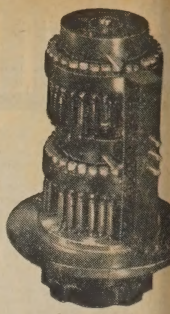
Address your letters to The Technical Editor, RADIO, TELEVISION and HOBBIES, Box 2728C, GPO, Sydney.

Note that we do not deal in radio components. Price quotations and details of merchandise must be obtained direct from our advertisers.

FIXED AND VARIABLE ATTENUATORS

FOR BROADCASTING, SOUND PICTURE, TELEVISION AND AUDIO ENGINEERING

GENERAL SPECIFICATIONS FOR LADDER NETWORKS



In order to retain the small diameter of the unbalanced units, tandem construction has been adopted for the Bridged "T" Balanced Ladder Networks and the Balanced Potentiometers. The two bodies are coupled by a moulded Bakelite terminal block. The two wipers are on the one shaft. Bridged "T" and Balanced Ladder Variable Attenuators are recommended as main gain controls in high quality broadcast equipment, recording studios and theatre sound-projection systems.

Where it is necessary to control the gain of push-pull amplifiers, the type BP Balanced Potentiometer is recommended. Three impedances are offered as standard, but other impedances can be supplied to special order.

SPECIFICATIONS

SIZES.—Diameter, excluding escutcheon, 1¾ inches.
Depth Behind Panel, 3½ inches.
Overall Length, 4½ inches.
Escutcheon Diameter, 2¾ inches.

WEIGHT.—Unpacked Weight, 12oz.

SHIELD.—Fully shielded and protected against dust and mechanical injury by a spun copper can positively locked in position by a locking ring. Easily removed for inspection. Satin Nickel finish.

MAINTENANCE.—Lubricate main shaft bearings every 12 months. **Cleaning of the contacts is not necessary.**

IMPEDANCE.—Type BT and BF, 50, 200 or 60 ohms.

Type BP, 10,000, 100,000 470,000 ohms. Other im pedances to special order.

INSERTION LOSS.—
Type BT, Zero.
Type BF and BP, 6db. for 1. ratio.

RANGE.—0-39db., in steps of 1.5db., tapered to infinit on last step. Anti-clockwise rotation for increase attenuation.

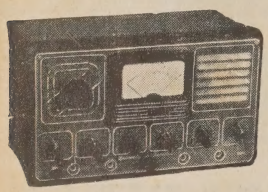
Suppliers to Manufacturers, Wholesalers and Broadcast Stations.

GORDON F. MEE *Specialised Electronic Produ*

6 ROWERN COURT, Box Hill, Victoria, E11

TRADE IN YOUR OLD INSTRUMEN

Test instruments have advanced greatly in recent years, so why not trade in your old instrument on a new, more comprehensive model. You will receive a good price for your old instrument (regardless of manufacture), which will pay much towards the cost of your new instrument.



Experienced Radio men know the value of the AST Signal Tracer and VTVM. Location of faults in Radio and audio frequency equipment is easy with the AST. A goodwill earner and big profit maker. Efficient Service organisations need this instrument. RF tuning range 175 KC-18 MC. VTVM to 500v AC/DC.

£60 Plus tax 12½%

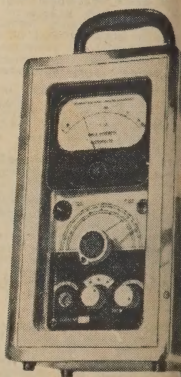
Reports show that SEAL F.S. Meter is being successfully used in "good" and "difficult" locations throughout the viewing areas in N.S.W. and Victoria.

- Literature available on all instruments, AWA, Paton, etc.
- Easy terms available on ALL test equipment. All NSW, and certain towns in Victoria and Queensland.
- If you have a test instrument requirement, regardless of make, local or overseas, let us know. Demonstrations of equipment may be arranged for any time, day or evening, to suit you. You are under no obligation to purchase.
- Trade-in service applies to all States. Attractive freight conditions.
- Reliable after-sales service always.

City — Country — Interstate

THYRON RADIO SUPPLIES

233 VICTORIA ROAD,
GLADESVILLE, N.S.W. WX3428



THE NEW SEAL Strength Meter has al wanted features stresse aerial installers. Heaps of sitivity, Accurate, Por Ruggedly built, Knife Tuning of sound and pictu all channels. Accurate ings from 5 microvolts t millivolts. Head phone toring of sound and pi 300 ohm and 75 ohm direct into Meter. Valve d ed—Long battery life— gauge steel case of chipfre Blue enamel and chrome tecting rim. **Excellent £69, plus tax 12½%.**

SET WITH 6" TUBE

ontinued from page 73)

b-chassis normally sits atop the ssis, with its larger dimension and rear and the flanges down e. The valves are in pairs on le of the CRO tube, the line adjacent to the tuner and the mplifiers to the audio system.

owing just a little slack in the d temporarily withdrawing the me tube, the sub-chassis can be ut and stood on end, allowing ssary checks to be made with ver in normal operation.

ggest that two SM28 tagstrips ited side by side between the ckets.

vo centre contacts in each can as return points for the 4.7meg plate resistors, allowing any hem to be isolated as required rned either to a shift potential, ormal reference potential or to or other of the shift circuit.

arranged for a particular tube, re should thereafter remain sub- central on the screen.

our tags adjacent to the centre n support the other ends of the and therefore provide one ter- for each of the four coupling rs and for the relevant leads back to the deflector plates.

rame plate leads can be twisted tness but the line plate leads ot be twisted or tightly bound precaution against unnecessary apacitance. For the same reason, ust not be longer than strictly y.

end tag points on the strips can to provide a couple of B-plus plus two other junction points components feeding the respect- ds of the lower frame and line rs.

there, of necessity, the discussion id. While the description assumes of a VCR97, the ideas are ap- to a lesser degree to other dis- tubes and we may be able to ip with further suggestions in a ient issue.

RADE REVIEWS ND RELEASES

(Continued from page 79)

in high frequency unit is mount- xially with the 12in bass speaker, ndles the range of about 3 to the lower cone being responsible range between 40 cycles and 3 Both speakers are completely sep- the HF unit being mounted on a idge bolted to the main frame. It htly offset to avoid symmetrical effects.

mple capacitor cross-over is con- in series with the HF unit.

test, the bass response was ex- y good, with plenty of power- ng capacity although slightly efficiency by comparison with others. There is a rise in output region of 2-5 Kc, and a second the region of 7.5 Kc, after which output slowly dies away. This response gives considerable presence, and the higher peak is probably comparable with that which is often found in its competitors.

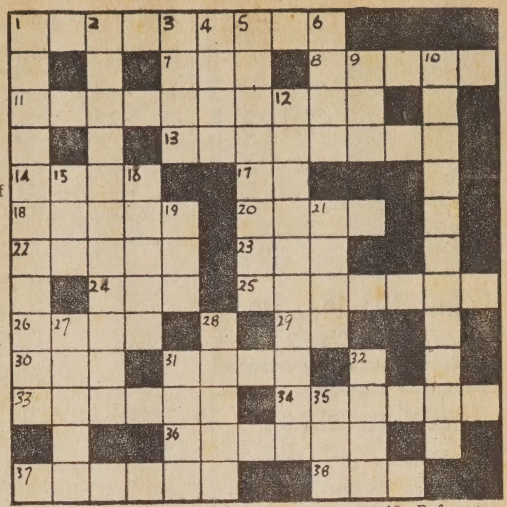
Mounted in an enclosure of about 8 cubic feet results were impressive, assisted by a very low cone resonance of about 35 cycles.

Valuable, too, are the very complete instructions on how to make two well-designed enclosures suitable for use with it.

BE YOUR OWN BOSS

Make £10, £15 or £20 a week at home in your spare time. Send for details of my Guaranteed Money-Making Plans. Special courses of instruction FREE. Don't miss this opportunity for extra cash. Write NOW to Desk R.H., PROFIT ENTERPRISES (reg.), Box 5070, G.P.O., Sydney.

THE R., T.V. & H. CROSSWORD No. 52



ACROSS

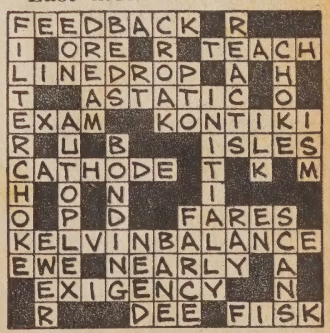
1. Another name for triode.
7. A charged particle in a liquid or a gas.
8. Circuit point, the potential of which cannot be changed.
11. A change in a capacitor's apparent capacity, due to displacement of electrostatic field (2 words).
13. Tenacious persons.
14. Short for Charles.
17. New Hampshire (abbr.).
18. Measure of weight.
20. One of the United States.
22. Speak.
23. A beverage.
24. Compass point.
25. Exertions of strength.
26. A narrow street.
29. Foot (abbr.).
30. An age of time.
31. Incite.
33. Channels for conveying waste water.
34. Types of trees.
36. Sounded as a horn.
37. A non-metallic element.
38. A product of wood ash and water.

DOWN

1. Windings with abnormal field linkage.
2. Antenna composed of a number of parallel wires (2 words).
3. Untruths.
4. The upper portion of a barn.
5. Unlimited.
6. Head support.
9. Consumed.
10. TV receiver adjustment aid (2 words).
12. The reception of a signal additional to, and later than, the desired one (2 words).
15. Hovel.
16. Part of a play.
19. Before.
21. To carry as on a breeze.
27. The principal artery to the heart.
28. Wilful burning of property.
31. Preposition meaning up to.
32. Describing a current induced in a conducting material by a varying magnetic field (2 words).

Solution and further crossword next month

Last month's solution



Printed and published by Sungravure Ltd., at the registered office, 21-29 Morley Avenue, Rosebery, N.S.W.

AWA
RONETTE
MICROPHONES & ACCESSORIES

Type TO-284

£2'15'3

Turn-over pickup cartridges for standard and long play.

Available in Alternative response characteristics as models OV., P., T., TS., PX.

CHANDLERS Pty. Ltd.

Albert and Charlotte Sts., BRISBANE.
and leading wholesalers.

ALWAYS RELY ON R.D.S.

R D S Stockists of Television parts, Picture Tubes and Turrets

We can supply all Radio and Electrical Components and are agents for the famous Hotpoint Radio Sets. Distributors of Test Equipment, valve and Circuit Tester, Multimeters, etc. A Complete Mail Order Service for the Countrymen. Call, write or phone to:—

The Independent Wholesaler
RADIO DESPATCH SERVICE
Radio and Electrical Distributors,
GROUND FLOOR, WEMBLEY HOUSE.
841 GEORGE STREET, SYDNEY.
Phone MA1876. Open Saturday Mornings.

STOTT'S
Home-Study
Course in Radio
Will Help *YOU*

It has been specially designed to meet the needs of Radio Servicemen, Salesmen, Amateurs, Dealers, Experimenters, and others interested in this work.

A N.S.W. Student wrote:
"The Lessons are simply explained and anyone, without knowledge of Radio can follow them quite easily."

Send the Coupon for full particulars.

Stott's Correspondence College

100 Russell St., Melbourne; 149 Castlereagh St., Sydney; 290 Adelaide St., Brisbane; 21 Grenfell St., Adelaide; 254 Murray St., Perth.

CUT HERE & POST

To STOTT'S: Please send me, free and without obligation, full particulars of your Course RADIO FOR AMATEURS.

My Name .....

Address .....

..... Age ..... (R.H.858)

Printed and published by Sungravure Ltd., at the registered office: 21-29 Morley Avenue, Rosebery, N.S.W.

WANTED TO BUY, SELL OR EXCHAN

Advertisements for this column should reach us one month before the date of issue and cost 3/3 per line. There are approximately seven words per line.

FOR SALE: Back Nos. R. and H. for sale. April, 1939, to Oct., 1956, 2/ posted. Nov., 1956, to current copies, 3/ posted; quote on large lots, also will buy spare R. and H. you have. If out of stock, I will get it for you. **A. J. Cox, 13 Glover St., Belmont, N.S.W.**

FOR SALE: Brand new Tape Deck £15; high qual. amplifier £22; 12in speaker £10; 3-srd. auto ch. table R'gram. £35; Philips car radio £23; HMV English TV £50; Returning U.K. **Lt. Cdr. Bates, 27 Bower St., Manly, N.S.W XU2780.**

FOR SALE: Model Engineers Blue Prints, all Subjects, Great variety. Send for 5/6 Catalogue. **Bolton, 72 King St., Sydney.**

FOR SALE: Portable 4-Channel mixer as in R.T.V. and H. Dec., '55, including 14 valves, level meter monitor, studio and TB amp, treble and bass controls, Hi-imp in and out, weight 20lbs, sell £100. Also 8-valve stereophonic amp £30, will demonstrate. **Sydney, YU3225.**

FOR SALE: Williamson amplifier, almost completed, all new parts, and Goodmans Axiom 150 speaker. Must sell, take reasonable offer. **Edwards, Flat 5, 49 Partridge St., Glenelg, S.A.**

AMPLIFIER: (25W) U-L KT66's, Power Pack Professional design, Construction. Offer. **3A Delhi St., Mitcham, Victoria.**

ELECTRONIC ORGANS: We have a specialist booklist of this subject, now available. It covers every known work in English and French, including new edition of Dorf's "Electronic Musical Instruments." Please write for a copy of this brochure — free and post-free. **Electronics Publications, 11 Cadow St., Pymble, N.S.W.**

SELL: A.W.A. Commun. Recvr. Mod. A M R-100 RCVR full set change coils .48-26 M.C. power unit and speaker. £10 or offer. **J. Dougherty, Gordonvale, Q.**

SELL: Radiogram 17 watt U/L Playmaster, No. 6 Pre Amp. R. and H. Bandspead tuner, separate tuner power supply, Ortofon Trans. arm and head, diamond stylus, Orpheus tran. T/Table in large cabinet ample record stowage. Battery Wharfdale speakers 15/CS, 10/FS, 5/CS cross-over 800 C/S-8KC/S in S/F corner Wharf. enclosure matched to cabinet polished mahogany. £225 or close offer. Also one S/F enclosure suit 12 inch speaker, £10. **Melbourne, BX5481 after 7 p.m. and weekends.**

AIRCRAFT Radio for Sale: A.R.C. 10 channel transmitter, weight 3.4lb. A.R.C. 118-135 megacycles tuneable receivers, weight 8.6lb. Bendix TA2J transmitter R.A. 10 receiver. Inquiries, **Thiess Bros, (Old.) Pty. Ltd., Fairfield Road, Yeerongpilly, Qld.**

SELL: Vibrator units 12v-250v-60ma also 30ma ex. A.W.A. perf. order. full £3/10/ ea. **UA2569, Sydney.**

SELL: FM Tuner (new) with dipole, former, £20. RJ enclosure, £10. worth Ave., Mascot, evenings, weekend

SELL: Every back issue R.T.V. and H in stock. 2/ per copy, two or mo 1/6 ea. Jan., 1957 to date, 3/ ea. include postage. **T. Weir, 50 O'Connor erfield, Sydney, N.S.W.** For inquiries tits quotes or if you have copies to se ring UA2569 any time.

EXCHANGE: Good German 35mm ca SX-28, AR-88, AMR-200 or similar justment in cash if necessary. **J. Bu Fleurs Rd., Woollongabba, Brisbane.**

WANTED: Hallicrafters S39 receiver. oak, 31 Fleurs Rd., Woollongabba,

SIDELINE: Will help beat the cost o **Write Practial Projects, Box 54, P.O. mere, N.S.W.**

FOR SALE: FS6 transceiver, power sup condition. £20. **MU9279, Sydney.**

MARK III I.F. strip 21in cabinet U MVA/2 multimet. **LX4292, Sydney.**

TAPE-TO-DISC: Fastest service, lowes 7in 45 LP (max. 7 min.), 15/6. 7in 45 LP-extended (max. 12 min.), £1. 7in 33 1/3 LP (max. 15 min.), £1/5/. 10in 78 STD, (max. 7 min.), £1. 12in 78 STD. (max. 9 min.), £1/5/. 10in 33 1/3 LP (max. 30 min.), £2. 12in 33 1/3 LP (max. 40 min.), £2/10/ Add postage to above. Forward tape, tions and cheque or P/N, or we forward Delivery 7 days.

SELL: Ibbott crystal cutting head, neve £10. **Vista Recording Studios, 76 B St., Hamilton, N.S.W.**

SELL: Cheap. Van Ruyten 32DC, 240 verter. MN26C Bendix Radio comp ceiver. **S. Anderson, Rose St., Parkes, N.S**

SELL: AT5, AR8, ACU, Type S 240v supply, AR8 fitted with 6V6 output, speaker in separate box, padded headphone working from power supply but AT5, A touched. New condition, all valves £50, liver Sydney. Also Palec VCT £7/10/. **"Newcastle Sun," Newcastle.**

WANTED: A good communication recei **Zylstra, "Firecraft," Woodford, N.S.W phone Hazelbrook, M204.**

LEARN WHILE YOU BUILD A RECEIV

(Continued from page 55.)

large diameter provides a degree of control which is quite surprising, and the user is unlikely to experience any difficulty in tuning the set on this score. On the credit side there is a decided simplification and saving in cost, while the knob is an attractive unit which will go well with most cabinet designs. A smaller matching knob is also available for the volume control.

First adjust the dial so that the extreme low frequency end of the scale falls opposite the pointer when the gang is fully closed. Now tune in a station at the low frequency end of the band around 600 Kc (2FC in Sydney, for example) and note how this checks with the dial calibration.

If necessary correct the position by adjusting the oscillator core, which will cause the station position to shift either way as required. Follow this by adjusting the aerial core, this time for maximum signal strength. Keep the volume turned low while making this test.

Now tune in a station around 1300 Kc (say 2SM, in Sydney) and note the calibration error. This is corrected by adjusting the oscillator trimmer, followed by adjustment of the aerial trimmer to produce maximum volume. You may repeat the procedure at each end if you like, but there should not be a great deal of interaction between the two.

Assuming that you have not been to have the IF channel correctly a ed, this can now be "touched up," a signal from one of the broa stations as a guide.

Try to select a weak but steady nal for this job, such as one o stronger country stations in day Keep the volume low and, after m sure that the signal is correctly t in, adjust each IF core in turn for mum signal strength.

Except in the case of the secon of the second IF the response wi quite sharp, and the improvement be considerable. The abovementi secondary may also help, but the ponse will be rather broad due to loading of the detector circuit.

This method of adjustment wil least ensure that all windings are approximately the same frequency, if this is not exactly the required Kc. The effect of the entire channel ing off frequency is not particu serious, except that some interfer problems may be aggravated in ce difficult areas, but these are ex tional.

However, in terms of sensitivity selectivity, the performance will be d mined mainly by the accuracy which you can set each core for m mum output.